

The Nutritional Knowledge, Eating Habits, and Body Image of Adolescent Females

Sarah K. Gray, Hons B.Kin., B.Ed.

Department of Graduate and Undergraduate  
Studies in Education

Submitted in partial fulfillment  
of the requirements for the degree of  
Master of Education

Faculty of Education, Brock University  
St. Catharines, Ontario

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## **Abstract**

This mixed methods investigation examined the nutritional knowledge and habits of adolescent girls in grades 9 through 12 at a secondary school in southern Ontario. Through questionnaires, interviews, and the use of teaching and curriculum documents, this study attempted to understand whether the current nutrition curriculum is influential in developing students' nutritional knowledge, healthy eating habits, and a favourable body image. Data collection occurred over a 2-month period, involving 90 female participants, and the data analysis program SPSS was used for analysis of the quantitative questionnaire data. Interview data were organized into categories, and analysis of any emerging themes occurred. Teaching and curriculum documents were examined to determine any overlap and develop an understanding of the participants' exposure and experience within nutrition within the classroom setting.

The findings of this study suggest that the current nutrition education did have an impact on the participants' nutrition knowledge. However, the impact on their eating habits and body image was limited in the context it was measured and tested. The knowledge learned within the classroom may not always be applied outside of the classroom. This study suggests that improvement in the current nutrition curriculum may be needed to have a bigger impact on adolescent females.

The findings from the study shine light on areas of improvements for educators as well as development of future curriculum. Changes may need to be made not only in the specific curriculum content and expectations but also the delivery of it by the classroom teacher.

## **Acknowledgements**

I would like to thank the staff and students at the high school in which this research study took place. The research would not have been possible without their patience, commitment, and support. It was amazing at number of staff and students who were willing to volunteer their time and energy in the name of educational research.

I would also like to thank my thesis committee and especially my thesis supervisor for always encouraging me to produce my best work and challenging me to look at things from another perspective. I have grown as a researcher and as an individual as a result of their influence.

Finally, I would like to thank my friends and family for their encouragement and understanding throughout the process. The support they provided me was abundant and unconditional. Most important, I would not have been able to complete this process without the continuous love and support of my parents. Their own drive, determination, and hard work have always inspired me to continuously challenge myself and always produce my best work.

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## **CHAPTER ONE: INTRODUCTION TO THE STUDY**

Present media and literature relay a message of severe concerns about the state of Canadian children's and adolescents' body weight and shape. The message most often portrayed is that Canadian society is in a state of crisis, with the number of overweight and obese children almost doubling since 1979 (Shields, 2005). These reports are a cause of concern for Western countries in which a slender body is considered to be desirable (Attie & Brooks-Gunn, 1992; Levine & Smolak, 1992). A decrease in the amount of daily physical activity, an increase in the number of daily calories, and an increase in the consumption of energy-dense foods are thought to be contributing to the increase in the rate of adolescent obesity.

However, recent evidence suggests that there is an increasing number of teenage girls in Western countries who are developing unhealthy eating habits and, for some, these unhealthy habits are developing into an eating disorder (Eagles, Johnston, Hunter, Lobban, & Millar, 1995; Lucas, 1992; Whitaker, 1992). The increasing prevalence of disordered eating and eating disorders, in addition to the decreasing age of those being diagnosed with these disorders, is disconcerting. Cases of dieting, weight loss attempts, and eating disorders have been documented in children as young as 7 years old (Ricciardelli & McCabe, 2001).

Over the last 30 years, the increase in body image problems and eating disorders has been mirrored with an increase in the number of overweight children (Chinn & Rona, 2001; Troiano & Flegal, 1995). These two parallels suggest that the nutritional knowledge, eating habits, and body image of adolescent children should be of great concern to educators and health care professionals.

Although nutrition, body image, and a healthy lifestyle are part of the Ontario curriculum, one must question whether or not the present curriculum and education system address the problems faced by today's adolescents.

### **Background of the Problem**

Adolescence is a difficult time in an individual's life. At any particular time, each individual may undergo a number of developmental changes, physically, mentally, and emotionally (Larson & Asmussen, 1991; Larson & Lampman-Petratis, 1989; Larson, Moneta, Richards, & Wilson, 2002; Spear, 2002). In addition, one's peers become a strong influence in decision-making, self-confidence, and self-esteem (Brittain, 1963; Brown & Lohr, 1987; Young & Ferguson, 1979). These changes have been found to influence an adolescent's nutrition and eating habits. The directive of the current education system is to provide knowledge and to educate the students in order to assist them to make good decisions. However, the ideas taught in class are not always conceptualized and applied outside of the classroom (Barnett & Ceci, 2002). Furthermore, with the rise of children and adolescents who are overweight or obese coinciding with those who suffer from disordered eating or an eating disorder, there is cause for concern about the present and future health of Canadian youth.

In Ontario, nutrition and healthy eating are not incorporated into the health and physical education curriculum in each grade (Ministry of Education and Training, 1998, 1999a, 1999d). Also, teachers at some grade levels may not have academic background in the subject matter, which may hinder curricular effectiveness (Ontario College of Teachers, 2008). Taking this information into consideration, one must wonder if the



present curriculum and education system are effective and meet the needs of all the students.

### **Statement of the Problem Situation**

Proper nutrition and healthy eating combined with physical activity are essential to the maintenance and development of a healthy lifestyle for people of all ages. Health professionals and researchers have established a healthy body weight and height range, referred to as a body mass index, for children and adolescents (Cole, Bellizzi, Flegal, & Dietz, 2000). Although the use of body mass index may be considered to be controversial when applied to school age children, it can be useful when comparing large populations (Panjikkaran & Kumari, 2009). In recent years, there has been an increase in the number of adolescents on the polar ends of this spectrum. It is this very problem that the current education system needs to address.

The amount of daily physical activity in which people engage and their eating habits affect their body weight and shape. Over time, if students continue to have poor eating habits and do not engage in physical activity, they are likely to become overweight or obese (Hayden, 2002). On the other hand, too much physical activity and malnourishment can also cause students to have an unhealthy body weight, shape, and development (King & Coles, 1992).

It is essential that healthy eating and nutrition habits are established early in an adolescent's life because these habits will stay with them the rest of their lives (Bundred, Kitchiner, & Buchan, 2001).

Although nutrition is taught in today's schools, there is an apparent disconnect between the information taught and the application by the students to situations outside

the classroom (Murphy, Youatt, Hoerr, Sawyer, & Andrews, 1995). The most favourable age for nutritional education has been identified to be 8-12 years of age. Studies have indicated that lifelong eating patterns and habits are established during these years (Kelder, Perry, Kleep, & Lytle, 1994; Murphy, Youatt, Hoerr, Sawyer, & Andrews, 1994; Winter, Stanton, & Bousley, 1999).

A person's body image is "a term that refers to a person's inner picture of his or her outward appearance. It has two components: perceptions of the appearance of one's body, and emotional responses to those perceptions" (Gale Encyclopedia of Medicine, 2008). In the past, studies have focused on a person's body image and how it relates to their feelings towards particular body parts (Mahoney & Finch, 1976). Other studies have concluded that there is a relationship of body image to height and weight (Cash, 1990).

For some people, personal body image is influenced by nutritional knowledge and eating habits as a result of their trying to apply new learning to change their own bodies (Nowak, 1998). A school environment can prove to be an effective setting for an intervention to help improve a student's body image (McVey, Davis, Tweed, & Shaw, 2003). It was of interest in this study to determine if there is a relation of body image and nutrition curriculum as well as further health and physical education classes in school.

Nevertheless, few studies have focused on whether or not the nutrition curriculum taught in Ontario high schools is effective in increasing the nutrition knowledge of the students, assisting in the development of healthy eating habits and the development of a favourable body image.

### **Purpose of the Study**

Present and past studies have looked at whether nutrition education programs can improve the knowledge or change the eating habits of the students participating in the programs (Ellis & Ellis, 2007). Often these programs are created and implemented in order to achieve the study's objectives. Few studies have examined whether or not current curriculum and classroom practices are effective in changing the students' nutrition knowledge, eating habits, and body image. In Ontario, nutrition and healthy eating are taught in elementary school but are not part of the curriculum in the first year of high school (Ministry of Education and Training, 1998, 1999d). Furthermore, 50% of students do not enrol in physical education courses after their first year of high school (Dwyer et al., 2006). Consequently, many students do not receive nutrition and healthy eating information after they leave elementary school. Elementary school teachers are usually required to teach a variety of school subjects. Often, a number of these subjects that an elementary classroom teacher is required to teach are not within the realm of the teacher's university degree. Therefore, many students do not receive nutrition information from qualified and experienced teachers in the field of nutrition (Ontario College of Teachers, 2008). In contrast, in high school, the classroom teachers most often teach subjects that specifically relate to their undergraduate university degree. This suggests that high school health and physical education teachers, science teachers, along with family studies teachers may have more knowledge about nutrition and healthy eating habits.

A thorough search of the literature did not disclose evidence of whether Ontario students who take health and physical education courses beyond the mandatory grade 9

course or those who take other courses that contain a component of nutrition curriculum have greater nutritional knowledge or are able to translate this information into healthier eating habits and a favourable body image.

This study examined whether or not the students who continue to enrol in health and physical education classes at the high school level or have taken a course in which nutrition is part of the curriculum at the high school level have greater nutrition knowledge, healthier eating habits, and a more favourable body image than those who do not.

### **Research Hypothesis**

The purpose of this study was to determine whether or not an increased exposure to nutrition curriculum has an effect on a student's nutrition knowledge, eating habits, and body image. One would suggest that an increase in exposure to nutrition curriculum would result in an increase in nutrition knowledge and an improvement in nutrition habits and body image. However, any increase in knowledge may be a result of maturity and development and not necessarily due to the information learned in class. A lack of change in eating habits may be due to external pressures, such as media and peers, which are very strong during adolescence. Nonetheless, students who have taken further education courses within the realm of nutrition should have an increased knowledge base, which suggests it may translate into better eating habits and a more favourable body image.

The following general research question was investigated: "Do adolescent females who are exposed to nutrition curriculum during high school have greater nutritional knowledge, better eating habits, and a more favourable body image than students who are not exposed to the curriculum?" This is an important area of study because of the rise in

public concern over the current health of adolescents. With a growing number of children and adolescents who are overweight, health and physical education have come to the forefront. It is important to learn if the current curriculum is helpful in assisting students in establishing a healthy lifestyle.

In the present study the following specific questions were investigated:

1. Do the current curriculum and high school programs facilitate an increase in the nutritional knowledge of adolescent females, and is this related to their eating habits or body image?
2. Do the current curriculum and high school programs assist adolescent females in making healthier food choices and establishing healthier food habits, and is this related to their nutritional knowledge or body image?
3. Do the current curriculum and high school programs assist adolescent females in developing a more favourable body image, and is this related to their nutritional knowledge or eating habits?

### **Theoretical Framework**

In order to best understand the development of a student's nutritional knowledge, application of this knowledge, possible changes in eating behaviour, and influence on body image will be studied. This study was framed using Bandura's social cognitive theory. Bandura's theory uses a context which explains the cognitive, emotional, and behaviour aspects for understanding behavioural change as well as the basis for intervention to change behaviour (Bandura, 1997). Also, according to Bandura, evaluating an individual's behaviour change is dependent on the environment, people, and behaviour.

An individual's behaviour may be learned through his or her social experiences within the environment. Socioecological factors may contribute to the learning and adoption of an individual's personal and societal standards that shape his or her behaviour. Further, an individual's environment provides examples or models for the behaviour (Perry, Baranowski, & Parcel, 1993). This suggests that individuals can learn different behaviours not only from direct experience and reinforcement from others but also indirectly by observing others within the environment (Corwin, Sargent, Rheasume, & Saunders, 1999).

Bandura suggests that an individual's personal parameters can have an impact on the cognition, affect, and behaviour of the individual. Further, one of the most influential personal factors that affects learning is a person's self-efficacy (Bandura, 1978). Self-efficacy is an individual's belief that he or she can successfully perform a desired behaviour and produce the required outcome. It affects not only the success of the behaviour but also whether or not the person will decide to put forth an effort and engage in the behaviour (Bandura, 1994). With certain health behaviours, especially ones that are considered appetitive or addictive behaviours, the consequences of the behaviour can reinforce or inhibit its occurrence (Bowen & Grunberg, 1987). Additionally, the value that an individual places on the consequence also determines whether or not the behaviour will be demonstrated (Corwin et al., 1999).

Several studies have found that selected social cognitive theory components have been effective in nutrition education programs (Corwin et al., 1999; Kirby, Baranowski, Reynolds, Taylor, & Binkley, 1995; Parcel, Edmundson, Perry, & Feldman, 1995). Contento, Manning, and Shannon (1992) concluded that "nutrition education generally

had a positive effect on cognitive outcomes such as nutrition knowledge, diet-related skills, behavioural expectations, and self-efficacy” (p. 247). However, according to Potter and Wood (1991), Contento et al., and Schlicker, Borra, and Regan (1994), even though gains in knowledge represent a step forward in nutrition education, these programs tended to have little effect on behaviour. This suggests that current nutrition curriculum and school programming may not meet certain conditions needed for individual change.

### **Significance of the Study**

It is often questioned whether or not the curriculum taught in schools is retained and applied by the students. Some students may learn the key concepts in class, but these concepts may be forgotten after a test or exam (Higbee, 1977). Furthermore, students may not understand concepts well enough or may have trouble applying them outside the classroom. Worse still, some students may not learn the information at all. Past studies and academic thought suggest that retention of information gained in a class may decrease over time (Bahrick, 1979; Higbee), despite studies that show some retention of information for up to 50 years (Bahrick, 1984; Bahrick & Hall, 1991; Conway, Cohen, & Stanhope, 1992). In either case, the length of retention is reflective of the original learning. What is original learning? An increase in the level of original learning of the course content increases retention performance over time. Tasks that involve recognition instead of recall are more likely to be remembered by the learners (Semb & Ellis, 1994).

In Ontario, it can be argued as to whether or not the nutrition curriculum taught in health and physical education, or other courses in which it is a component, is both practical and applicable to the students’ “real life.” The increase in number of students

with poor eating habits suggests that students may not be retaining the information in class or may not be able to apply it to external situations (Shields, 2005).

This study may have an important impact on how the nutritional curriculum is taught. The study will demonstrate whether or not students who take a high school health and physical education course or another course containing a nutrition component are able to retain the nutrition knowledge and apply it outside the classroom. The study will also look at whether or not the nutritional curriculum has an impact on body image of students. The results may affirm the current practices of the curriculum and high school teachers or may shed light on changes that could be made in the curriculum or to school programs and their delivery.

### **Outline of the Remainder of the Document**

Chapter Two reviews the current eating habits of secondary school students, examines the external influences and their effects on the unhealthy eating habits and development of adolescent females, and illustrates the current practices within Canadian schools and any alterations required for change.

Chapter Three provides a description of the instrumentation and the procedures used by the researcher within this study. This chapter also outlines the assumptions and limitations of the methodology and describes the ethical considerations of this research.

Chapter Four presents a detailed account of the findings from each of the three interview sets, interviews, as well as teaching and curriculum documents. Any interesting or anomalous data are highlighted, and themes or patterns evident in the data are identified, explained, and summarized.



Chapter Five explains conclusions, limitations, delimitations, and implications of the study's findings. The findings will be used to address questions raised in the literature review that formed the basis for the study. The conclusions will then be used to explain implications for nutrition education and school programs.

## **CHAPTER TWO: REVIEW OF RELATED LITERATURE**

The present literature review first describes the current eating habits of secondary school students. Second, the review examines the external influences and their effects on the unhealthy eating habits and development of adolescent females. Third, the review examines the relationship between body image and nutrition. Finally, the review illustrates the current practices within Canadian schools and those changes required to alter these practices.

### **Adolescent Growth and Development**

Adolescence is often described as an important yet difficult period in any person's life. It is during this time that a person is undergoing a tremendous amount of physical as well as psychological and emotional change and development (Larson & Asmussen, 1991; Larson & Lampman-Petratis, 1989; Larson et al., 2002; Spear, 2002). Adolescence is marked with a rapid amount of physical growth. During the decade between 10 and 20 years of age, females typically gain an average of 20 kg of lean body mass and 9 kg of body fat. This era is also marked by the development of fully functioning sexual organs (Mann & Truswell, 1998). These changes in the body often lead females to feelings of body self-consciousness, which in turn may lead to body dissatisfaction (Davies & Furnham, 1986). This may be why adolescence is often characterized as a peak time for body image dissatisfaction (Hill, 2002).

Hill and Lynch (1983), in their gender intensification hypothesis, suggest that during adolescent development, males and females begin to identify more strongly with their own gender stereotypes. With respect to females, the gender stereotype is one in which physical appearance and attractiveness are emphasized and used to evaluate their

self-worth (Stice, Cameron, Hayward, Barr Taylor, & Killen, 2000). Within the Western culture, the standard of comparison is one in which females are unquestionably thin (Nitcher & Nitcher, 1991). Females who internalize the Western ideals are more likely to feel dissatisfied with their bodies. The increase in body fat that females experience during adolescence drives them further from the ideal body image (McCarthy, 1990). This situation instils vulnerability in females and makes them more susceptible to “buy in” on the cultural ideals and experience more body dissatisfaction (Jones, 2004; Stice & Bearman, 2001).

The importance of body image dissatisfaction which some females experience is that it can affect their food choices (Middleman & Durant, 1998). This has a cyclical effect, since body image dissatisfaction may lead a female to make unhealthy food choices, which in turn affects her body development and increases her dissatisfaction. The increase in body fat that females experience during the early years of adolescence, in addition to their preoccupation with body image, influences their dieting behaviours (Chapman, 1994). Conjunctly, adolescence is marked with a huge change and formation of an individual’s personality and ideas (Hurson & Corish, 1997). Adolescence involves changes in individual lifestyles and creation of personal eating habits (Cardamone-Cusatis & Shannon, 1996). This is important because learned food habits from an early age are difficult to influence or change later in life (Brown, McIlveen, & Strugnell, 2000; Hamilton, McIlveen, & Strugnell, 2000). Kelder et al. (1994) conducted a 6-year longitudinal study of adolescent smoking, physical activity, and food choices. They found that although people may improve their health choices over their lifetime, those who

made the fewest healthy choices at the beginning of the study also made the fewest healthy choices at the end of the study.

### **External Influences on Adolescent Nutrition and Development**

As a person matures and develops, there is an increase in his or her cognitive functioning and ability to process information. Therefore, the messages and images to which children and adolescents are exposed through the media have different impacts at different ages. Children 8 to 10 years of age are developmentally able to process advertisements but do not necessarily do so (Strasburger, 2001). By the age of 11 or 12, children's thinking becomes more multidimensional, involving abstract as well as concrete thought. "Adolescents still can be persuaded by the emotive messages of advertising, which play into their developmental concerns related to appearance, self-identity, belonging, and sexuality" (Bundred et al., 2001, p. 3).

In recent years the media has been targeted as a negative source of nutrition information, and many suggest companies target children and adolescents when advertising for unhealthy foods. The information presented in television advertisements for sugared cereals, sweets, and sugary drinks such as pop can often be misleading, as they are presented as being part of a nutritious diet (Kunkel et al., 2004).

Food advertisers spend more than \$2.5 billion per year to promote their food or restaurants and an additional \$2 billion to promote food products (Goodman, 1999). In 2006, Canadian adolescents 12 to 17 years of age watched 12.9 hours of television per week (Statistics Canada, 2006). Although in Canada no more than 8 minutes of every hour of children's programming may be devoted to commercials, this means that, on average, a Canadian child is exposed to more than 110 minutes of commercial

programming each week (Advertising Standards Canada, Association of Canadian Advertisers, Canadian Association of Broadcasters, Concerned Children's Advertisers, & Institute of Communications and Advertising, 2006). In addition, if children or adolescents watch programming that is not labelled "children programming," they may be exposed to more than 12 minutes of commercials every hour, which could total more than 169 minutes of commercial programming a week (CRTC, 2005).

Powell, Szczypka, and Chaloupka (2007) monitored the nonprogram content time of 170 top-rated children's television program in the United States and found that 27.2% of it was devoted to food product promotion and 36.4% to food-related products. A study of food advertising during children's television programming determined that more than half of the food advertising was aimed at children. Advertisements for fast food and sugary cereal comprised the majority of the food advertising (Connor, 2006). Ninety-one percent of the food products advertised were high in either sugar, fat, salt, or a combination of the three (Taras & Gage, 1995).

Television is just one source of media to which children and adolescents are exposed on a daily basis. The results of the Health Behaviour in School-aged Children report indicates that children between the ages of 10 and 16 spend, on average, a total of 6 hours watching television, playing video games, or using the computer (Health Behaviour in School-aged Children, 2006). While companies are limited to the type and amount of advertising that can be directed towards children on television, little or no regulation occurs over the Internet. Many food companies have turned to advertising on websites frequented by children to get their message across (Pidd, 2007). Within Canada, leading food and beverage companies have joined together in making a pledge to ban

advertisements directed to children under the age of 6 and limit food and beverage advertising to children between 6 and 12 years of age (Advertising Standards Canada, 2007). However, these pledges are voluntary and do not apply to websites outside of Canada.

Through advertisements, companies aim to create brand recognition and positive associations among children by using logos, slogans, and characters that appeal to children. Advertisers know that if children are particular to a product at an early age, they will be true to that product for the rest of their lives (Connor, 2006).

The amount of money spent on advertising of fruits and vegetables is minimal in comparison to the money spent on other foods, beverages, candy, and restaurants. In 2004, in the state of California, \$11.26 billion was spent on food, beverage, candy, and restaurant advertising. In comparison, the state's government spent \$9.55 million on their "Five A Day" campaign (Imholz, Savage, & Wu, 2005). These statistics suggest that children and adolescents have very little exposure to healthy eating information or persuasion.

The media also has a strong influence on an adolescent's body image. The mass media is believed to play a role in encouraging adolescent girls to form an unrealistically thin body ideal (Field, Camargo, Taylor, Bekey, & Colditz, 1999; Silverstein, Perdue, Peterson, & Kelley, 1986; Tiggemann & Pickering, 1996). Cross-sectional studies suggest that a positive association exists between a girl's exposure to beauty and fashion magazines and a girl's weight concerns or the presence of eating disorder symptoms (Stice, Schipak-Neuberg, Shaw, & Stein, 1994). The reasoning to explain these findings may be because as a female's exposure to the mass media is increased, the more likely

she is to compare her own body with those portrayed in the media (Festinger, 1954). Mooney, Farley, and Strugnell (2004) interviewed teachers and held focus groups for 15- and 16-year-old females. The focus group participants expressed a desire to have figures similar to those of celebrities even though they knew the bodies of celebrities were not representative of the general population. The students interviewed also knew extensive information on celebrities' diet and exercise habits. Furthermore, students believed that celebrity status existed mostly on appearance and not necessarily because of talent. Stice, Nemeroff, and Shaw (1996) theorize that women internalize the thin-ideal body of Western culture and understand the significant degree in which it is celebrated. They suggest that females will experience body and weight dissatisfaction because they are far away from the glorified, unattainable ideal. With a large proportion of the Canadian society being obese or overweight, it increases the likelihood of adolescent girls dieting or engaging in disordered eating to conform to the media standard.

Peers play an important part in an adolescent's weight and body concerns. To gain acceptance among their peers, adolescents may follow the beliefs and engage in the behaviours of their peer groups (Paxton, Schutz, Wertheim, & Muir, 1999; Sieving, Perry, & Williams, 2000). A study of the weight control practices of middle school girls and their peers showed a relationship between the girls' weight control practices and their peers (Troiano & Flegal, 1995). Mooney et al. (2004) found that gaining the approval of their female peers and the attention of males is a main motivation for female adolescents to be thin. The females in the study felt that their male peers are more attracted to thin females and that personality is not important.

Female adolescents are often very aware of each other's dieting or disordered eating, as they often discuss their dieting methods among their peers but are reluctant to tell their parents for fear that their parents will stop their efforts (Mooney et al., 2004). Also, female adolescents are more likely to comment or tease each other about their body weight. It is therefore not surprising that peer pressure has been found to be a risk factor for disordered eating and developing bulimia (Field et al., 1999).

Last, parents play an important role in the development of a child's development and eating behaviours. Young females often model the weight control behaviours of their mothers (Levine, Smolak, Moodey, & Hessen, 1994). It is therefore not surprising that several studies have found that females whose mothers are concerned about their body weight and shape are more likely to develop unhealthy eating habits (Hill & Franklin, 1998; Pike & Rodin, 1991). Children who perceive that their mothers are frequently attempting to lose weight are more likely to become constant dieters themselves (Field et al., 2001). In addition, comments made by an adolescent's mother towards her daughter's body weight have a bigger impact than comments by her father (Smolak, Levine, & Schermer, 1999). This suggests that mothers play a vital role in the transmission of body weight and shape ideals (Hill & Franklin; Pike & Rodin; Smolak et al.).

A study of 157 Scottish children found that parents were the listed as the primary source of nutrition information for 51% of the participants (Seaman, Woods & Grosset, 1997). Seaman et al. determined that parents are the most influential on their children's nutritional choices, when their children are between 5 and 8 years of age. These researchers also found that, after children reach the age of 8, television advertising, their



peers, and nutrition education programs within their school replace parents are the most important influences on children's nutritional choices.

### **Current Eating Habits of Adolescent Females**

The Canada Food Guide is a collaboration among health professionals to establish healthy eating guidelines for Canadians. Food is categorized under four major headings: fruits and vegetables, grain products, dairy products, and meat and alternatives. Each category is assigned recommended daily servings that one should meet for optimum health. However, recent studies have concluded that many Canadian adolescents are not meeting the recommended guidelines. The Canadian Community Health Survey on Nutrition concluded that with respect to fruits and vegetables, at the ages of 9 to 13, only 62% of girls and 68% of boys meet the recommended daily requirements (Garriguet, 2004). The Canada Food Guide recommends that adolescents should consume 3-4 servings of dairy products daily. However, of 10- to 16-year-old adolescents, "61% of boys and 83% of girls do not meet the recommended minimum of three daily servings" (Garriguet, p. 5). Furthermore, 33% of adolescent girls and 6% of adolescent boys have fewer than 5 of the recommended 5-12 daily servings of grain products. The only category within the Food Guide in which adolescents obtained the recommended daily intake is in the meat and alternatives. However adolescents just meet the minimum daily guidelines in this category (Garriguet).

Within the Canada Food Guide, a category is labelled as "other," for foods that do not fall under the four major categories. "Other" foods are generally processed foods which are high in fat, sugar, or salt. For adolescents aged 14 to 18, 25% of all their calories come from these 'other' foods (Garriguet, 2004). Further, with respect to

macronutrients, most adolescent diets fall within the acceptable macronutrient distribution range (AMDR) for protein, carbohydrates, and fat (Garriguet). Snacking is a common practice for adolescents. Food and drinks consumed between meals account for more calories than most adolescents eat at breakfast and about the same number of calories as they would consume at lunch. Forty-one percent of snack calories come from “other” foods (Garriguet).

### **Prevalence of Unhealthy Habits**

Many adolescents in Western countries may want to lose weight or feel as though they should in order to achieve the very thin body that is promoted and praised in Western culture (Hill, 2002). Despite being normal weight, adolescents may still feel as though they need or should lose weight in order to fit in and gain popularity. A survey of 500 school children 7-16 years old in Hamburg, Germany found that 50% of the girls surveyed evaluated themselves as “too fat” or “much too fat.” Of the girls who were considered normal weight, 47% stated that they were “too fat” or “much too fat.” Seventy-five percent of the surveyed students took steps to change their body weights (Westenhofer, 2000).

This trend continues in other countries, as national studies in the United States have shown that approximately two-thirds of adolescent females are currently attempting to control their body weights through dieting (Story, Neumark-Sztainer, Sherwood, Stang, & Murray, 1998). Similar statistics have been reported in other countries. In the United Kingdom, 30% of adolescent females are currently dieting. In addition, a national study in Ireland found that 18% of 12- to 14-year-olds and 24% of 15- to 17-year-olds have been on a diet in order to reduce their body weights (National Nutrition Surveillance

Centre, 2002). Within Canada, 35% of females in grade 6 have attempted to lose weight. This proportion of females increases to 64% in grade 10 (Boyce, 2004). By the age of 18, 80% of adolescent females of normal weight have reported that they would like to weigh less than their current weight (McCreary Centre Society, 1999).

Although dieting may be viewed as harmless and a necessary step for some adults and adolescents, it can be of particular concern for adolescents because of the potential negative outcomes. Studies have shown that dieting during adolescence may be a risk factor for the development of eating disorders such as binge eating, bulimia, and anorexia (Field et al., 2001; French, Jeffery, & Murray, 1999; Krowchuk, Kreiter, Woods, Sinal, & Dupont, 1998). In their study of London school girls, Patton, Johnson-Sabine, Wood, Mann, and Wakeling (1990) concluded that adolescents who often diet are eight times more likely to develop an eating disorder than those who do not diet. Moreover, eating disorders often manifest from “simple” dieting (Garrow, James, & Ralph, 2000). A study of Ontario school girls, 12-18 years of age, suggests that more than 25% of these students suffer from disordered eating behaviours and attitudes. In addition, it was found that there was a gradual increase in this behaviour throughout adolescence (Jones, Bennett, Olmsted, Lawson, & Rodin, 2001). Even further, 1 in every 100 to 200 Canadian adolescent females suffers from anorexia, and 1 to 3 of every 100 suffer from bulimia (Children's Mental Health Ontario, 2007).

### **Effects of Dieting**

The rapid growth during adolescence stresses the importance of proper nutrition. Inadequate nutrition could lead to future health problems (Crawley & Shergill-Bonner, 1995). Dieting can also have emotional and psychological consequences on an individual.

Caloric restriction associated with diets may lead an individual to be tired, irritable, depressed, anxious, have poor concentration, and suffer from mood swings (Garner, Garfinkel, Schwartz, & Thompson, 1980). Frequent dieters may also have sleep disturbance, menstrual irregularities, delayed sexual maturation, and growth retardation (Kirkley & Burge, 1989; Lifshitz & Moses, 1988; Mallick, 1983). Furthermore, people who engage in dieting are more likely to engage in smoking, alcohol, or other drug use (French, Perry, Leon, & Fulkerson, 1994; Killen et al., 1987).

Dieting may have some unexpected effects. A common technique employed by teenage girls to lose weight is to restrict their caloric intake. It is thought that the decrease in caloric intake will lead to a decrease in one's body mass. However, research done on self-reported caloric restriction suggests that weight is gained and not lost (Stice, Cameron, Hayward, Barr Taylor, & Killen, 1999; Stice, Presnell, Shaw, & Rohde, 2005). As a result, females expect a decrease in body mass and an increase in their own belief that they are in control of their body, and therefore a resulting increase in their own body dissatisfaction (Barker & Galambos, 2003; Bearman, Martinez, Stice, & Presnell, 2006).

### **Nutrition and Body Image**

A person's body image can impact his or her eating habits. Adolescent females who experience body dissatisfaction or have a poor body image may alter their eating habits. Fabian and Thompson (1989) concluded that body dissatisfaction was found to be highly correlated with eating disturbances among adolescent females. Body dissatisfaction is also a strong predictor of risk factors associated with eating disturbances (Attie & Brooks-Gunn, 1989; Leon, Fulkerson, Perry, & Cudeck, 1993).

Nowak (1998) completed a study of male and female adolescents ranging in age from 12 to 15 years. Participants were divided into two groups: those who were currently trying or had tried in the past to lose weight and those who had not. The participants who were currently attempting to lose weight or had attempted in the past had significantly different body images, eating habits, and food-associated beliefs and behaviours compared to those who had not tried to lose weight. Of the female participants who had dieted, only 19% of them were satisfied with their bodies. They were also more likely to feel that their body parts were fat. Compared to the male participants, females were more likely to use food as a method to manipulate their weight compared to their male counterparts. Females who were attempting to lose weight would avoid a food if they were aware it was high in fat. These females would also reduce their grains, meat, and dairy intakes. Further, the females in the study had a higher tendency to skip meals and continue these behaviours well beyond the commencement of a diet. These types of behaviours are concerning because of the resulting nutrient deficiencies and their possible long-term effects (Nowak).

### **School-Based Body Image Programs**

A number of studies have looked at the effects of an information-based school program to assist female students in establishing a healthy body image and healthy eating habits (Killen et al., 1993; Neumark-Sztainer, Bulter, & Palti, 1993; Paxton, 1993). The programs covered topics such as nutrition, eating disorders, and the sociocultural body image ideals. These programs were found to increase the student's knowledge of eating disorders but did not change their beliefs, attitudes, and behaviours which may contribute to the development of an eating disorder.

Fundamentally these studies showed a flaw in information-based programs. These types of programs fail to improve the participants' body image, eating habits, or attitudes. Further, these programs may glamorize eating disorders as well as inform the participants about the techniques and practices of the eating disorders (O'Dea & Abraham, 2000). Some researchers have suggested that these programs do more harm than good (Carter, Stewart, Dunn, & Fairburn, 1997; Garner, 1985; T. Mann et al., 1997).

Media programs to improve the body image of adolescents have also resulted in mixed conclusions. The focus of most media programs is to improve the media literacy of its audience by educating them on the media's artificial construction of an ideal body for males and females. By increasing the participants' awareness about the stereotyping which occurs within the media, the participants can understand the impracticality of it and develop strategies to combat the media's messages (O'Dea, 2005).

Neumark-Sztainer, Sharwood, Collier and Hannon (2000) conducted a media literacy program with Girl Scout troops. They found that as a result of the media literacy program, there was a decrease in the internalization of the ideal body. Results of other studies have shown that these types of programs may improve the nutritional knowledge of effects of dieting and causes of body fat among its participants but fail to show an improvement in their eating, exercise, or weight control behaviours (Shisslak, Crago, Renger, & Clark-Wagner, 1998).

O'Dea and Abraham (2000) developed a program which was student centred, interactive, co-operative, and worked on building self-esteem. Their program was the first intervention study to demonstrate a positive change in the participants' body image and eating attitudes. Other studies which focussed on improving the participants' self-esteem

and self-acceptance found success in reducing the participants' dietary restraint, shape, and eating concerns as well as dysfunctional eating behaviours (Phelps, Sapia, Nathanson, & Nelson, 2000; Stewart, Carter, Drinkwater, Hainsworth, & Fairburn, 2001).

### **School Nutrition Programs**

Learning about nutrition, healthy eating practices and developing a favourable body image within the school environment is essential for students. Schools provide a suitable environment to implement these types of health-promoting behaviours because adolescents are easily accessible and usually motivated to be involved in the educational activities (O'Dea & Abraham, 2000). The Ontario curriculum has specific learning expectations from kindergarten to grade 8. This curriculum offers teaching on a variety of nutrition and healthy eating practices (Ministry of Education and Training, 1998).

However in the high school curriculum, there are no mandatory courses that include nutrition, healthy eating practices, and body image. Healthy eating is not part of the curriculum in the mandatory grade 9 health and physical education class. Instead, nutrition, healthy eating, and body image are reintroduced to students in the grade 10 curriculum (Ministry of Education and Training, 1999d). Although in theory this would not seem to be a problem, studies have shown that female enrolment in physical education drops dramatically after grade 9. Dwyer et al. (2006) surveyed high school students across Ontario and found that 98% of the high school students take grade 9 physical education, but this number drops to 50% by grade 10.

Some adolescents may not be active on their own. Canada's Physical Activity Guide for Children and Youth recommends 90 minutes of physical activity per day or the equivalent of 16,500 steps (Canadian Fitness Lifestyle Research Institute, 2005). Girls

within the CAN PLAY study only took an average of 10,735 steps (Canadian Fitness Research Institute). A 2005 study examining the physical activity levels of children and youth in Nova Scotia found that 96% of grade 3 girls, 25% of grade 7 boys, and 1% of grade 11 girls participated in 60 minutes or more of moderate to vigorous physical activity 5 or more days a week (Campagna et al., 2005).

When students are enrolled in health and physical education class, they are ensured to be physically active 4 or 5 days a week for an entire semester. This drop in the number of female students taking health and physical education is of concern because research has shown a link between body image and physical activity among females (Marsh, 1994; Richman & Shaffer, 2000). Further, lack of physical activity has been linked to unhealthy eating behaviours among adolescents (Lytle, Kelder, Perry, & Klepp, 1995). If students are more active, they may be more likely to have healthier eating habits (Blair, Jacobs, & Powell, 1985).

Health and physical education are not the only courses in which students may experience nutrition education. Students who choose to enrol in senior level biology or family studies may also encounter nutrition curriculum. These statistics suggest that a large proportion of female high school students are not being exposed to important nutrition and healthy eating information.

It is important that the hidden curriculum of a school is not overlooked or forgotten. This includes the school's philosophy, nutrition policies, role modelling by staff, and the consistency of messages conveyed by the school (Dixey et al., 1999). Such aspects to an excellent school education program are sometimes overlooked. Studies have shown that educational strategies that have a clear behaviour focus and are theory driven



are more likely to succeed (Lytle & Achterberg, 1995). Therefore, the messages that are delivered about nutrition should be consistent between the curriculum taught in class and the school environment. In addition, reward systems or fundraisers should not be contradictory to the nutrition messages delivered. For example, schools should not reward students with sugary treats or sell them as a fundraiser. Other alternatives should be used as to not confuse students with contradictory messages (Ellis & Ellis, 2007). Furthermore, administration support of nutrition programs and policies within a school have been shown to increase the effectiveness of such programs (Weis & Klein, 1987).

Last, teacher education and training are imperative with respect to communication of good nutrition and healthy eating messages to students. Teachers need to depict the message of eating a variety of foods and emphasize the need for balance in one's diet. It is also important that these messages are taught in a positive, supportive, and motivating environment (O'Dea, 2005).

Teacher training and knowledge with respect to nutrition may be limited. A 1985 study of high school physical education, family studies, and science teachers found that less than 50% of these teachers had completed a nutrition course during their undergraduate degree (Vandenbygaart & Woolcott, 1985). Weis and Klein (1987) in their review of nutrition education programs found that teacher training in the field of nutrition not only increases the teachers' knowledge of nutrition but also increases the amount of instructional time spent on nutrition. Additionally, it is essential that teachers receive formal nutrition training because studies have shown that they inadvertently provide incorrect or inappropriate dietary advice. Teachers may portray messages of weight prejudice, body image stereotypes, and fear of food. These messages may be perceived

by the students as frightening and negative, which may in turn influence their body image and nutrition habits (O'Dea & Abraham, 2001; Piran, 1999; Ransley, 1999). Some prevention programs may inadvertently heighten awareness of body weight and increase weight concerns in adolescents. This often occurs because celebrities are commonly used as examples, which may glamorize and normalize dieting or disordered eating and further emphasize the very slim Western culture body image (Garner, 1988; Tomeo, Field, Berkey, Colditz, & Frazier, 1999).

### **The School Environment**

Within Ontario, the average high school student will spend 6 hours a day within the school environment. Due to a significant portion of his or her day being spent in the school environment, the average student will consume one third of his or her daily calories at school (Finkelstein, 2009). Most high schools in Ontario contain vending machines or a cafeteria that provide opportunities for students to purchase food for a meal or snack. Eves, Corney, Kipps, Nobel, and Lumbers (1997) found when children choose a meal at school, when given the opportunity of choice, their selections are high in fat, which can result in a poor balanced diet. While observing participants in five different schools, Warwick, McIlveen, and Strugnell (1999) found that the popular foods being purchased were chips, French fries, hamburgers, hotdogs, candy, and carbonated drinks. These types of foods do not provide students with a healthy and balanced diet. Only two or three macronutrients, of fat, carbohydrates, or protein, would be consumed and very little in the form of vitamins, minerals, and fibre.

The choices students make may be because of a lack of knowledge. McCullough, Yoo, and Ainsworth (2004) suggest that children and their parents may be aware of the

importance of limiting their sodium, fat, and sugar intake, but they do not have the required nutritional knowledge to do so. Participants in the McCullough et al. study had difficulty identifying foods that were high in these three nutrients. Although participants may have had the intentions to make healthy food choices, they did not have the nutrition knowledge to support them. Further, students may also choose their food based on their own food criteria such as the appearance of the food, the taste, and past experiences with the food (Gummesson, Jonsson, Conner, & Sveensson, 1996). Students may be hesitant to try new foods or do not like the appearance of something and will instead choose a food with which they are familiar.

There may be things a school can do within the school environment to assist students in making healthy food choices. Students who enter high school are taken from a relatively controlled environment in elementary school to an environment that has a vast array of choices, many high-sugar and high-fat (Story, Hayes, & Kalina, 1996). The Standing Committee on Health Report has suggested that a new mandatory, standardized, and simple food labelling should be established nationally to assist people in making healthy food choices (Report of the Standing Committee on Health, 2007). School administrators do not have to wait for this to be implemented; they could develop their own system of identifying healthy or unhealthy foods that could be user-friendly for the students.

Cost may be another factor that prevents students from choosing healthy foods. Healthy foods such as chips, candy, and French fries can be easily produced and therefore can be sold at a lower price than items such as a sandwich or fruit salad. One study found that the cost of food is the third most important factor for their food selection (French et

al., 1999). Other studies have found that decreases in the price of healthy food selections are met with an increase in the amount that is purchased by students (French et al., 1997; French et al., 2001). If schools were to provide healthier food selections at a lower price, students may be more inclined to purchase them.

A number of studies have found success in changing students' eating habits by getting them involved in the process of choosing the food available for purchase. Sutton (1995) found a school in which students acted as a link between the school and those providing food to it. The students gave input from their peers that assisted in developing healthier food choices for the school. The committee members also assisted in promoting healthy eating among their peers. In addition, if a school has a healthy eating policy and encourages students to follow it, students may be more inclined to make healthier meal and snack selections (Young, 1993). Students could have input in designing the nutrition policy and daily school menus, which may assist them in feeling accountable and more likely to take part (Harvey & Passmore, 1994).

In addition, a mandatory national school nutrition policy could be established to set up regulations that must be followed by food service companies within Canadian schools. Presently, most provincial and territorial governments' guidelines are voluntary and are not being followed by all companies in all schools (Finkelstein, 2009). A comprehensive national nutrition program would help to ensure that the health of the students was at the forefront of decisions made and products available for purchase.

### **CHAPTER THREE: METHODOLOGY AND RESEARCH DESIGN**

The purpose of this study was to determine whether or not students who have nutrition education in a high school setting or continue to enrol in physical education courses beyond the mandatory grade 9 course have increased knowledge of nutrition, healthier eating habits, and a more favourable body image. The specifics of the curricula taught to students are described along with an explanation of how female student candidates were selected to participate in the data collection. This chapter contains a description of the instrumentation used, followed by a precise description of the procedures used by the researcher. Finally, the validity and credibility of the instruments and the study, the limitations, and assumptions of the methodology are outlined and explained and the ethical considerations of this research are discussed.

#### **Description of Research Design**

This research study was composed of both qualitative and quantitative data. Qualitative data were collected through interviews with participants as well as through teaching documents collected. These data can be very rich in detail and context; however, qualitative data are typically reliant on the interpretations of the researcher. Therefore, it was imperative that the primary researcher remained impartial throughout the collection and interpretation of data. Quantitative data were collected through participant questionnaires. These data are governed by statistics; therefore any bias by the author will be minimal and thus will have limited effect on the study's results (Libarkin & Kurdziel, 2002). Although some data pertaining to the particulars of each individual participant were collected, the primary intent of the questionnaire data was the "statistics that result when data are abstracted from a number of individual cases" (Best & Kahn, 2003, p.

117). The combination of the two methods and variety of data collected provided for some triangulation among the data.

The research was designed to answer the following research questions:

1. Do the current curriculum and high school programs facilitate an increase in the nutritional knowledge of adolescent females?
2. Is this nutritional knowledge related to their eating habits or body image?
3. Do the current curriculum and high school programs assist adolescent females in making healthier food choices and establishing healthier food habits?
4. Are these healthier food choices related to their nutritional knowledge or body image?
5. Do the current curriculum and high school programs assist adolescent females in developing a more favourable body image?
6. Is this favourable body image related to their nutritional knowledge or eating habits?

### **Site and Selection of Participants**

This study used convenience sampling to determine its participants. This type of sampling was used because the participants were from the researcher's place of employment. McMillan and Schumacher (2001) define convenience sampling as "a group of subjects selected on the basis of being accessible or expedient" (p. 175). This type of sampling was suggested due to the personal nature of the information which was collected. The researcher was known within the school and it was decided that more students would be willing to participate in the study as well as feel more comfortable

completing all required parts because of the familiarity of the researcher. Furthermore, the study was conducted in parts, and the assistance of teachers within the school was imperative. It was determined that conducting the study within the researcher's own school would be less disruptive to the teachers and their classes.

The participants in this research study were selected from a high school in a suburban area that is part of a medium size city in southern Ontario. This school was selected because of its size and the connections the researcher had established within the school. The school is situated in an upper to middle-class neighbourhood. All female adolescent students within the school were invited to participate in the study. Students were informed about the research through announcements and classroom visits by the researcher explaining the purpose and process of the study. Interested students were given an information package which contained a letter of introduction and an informed consent form (to be signed by themselves, or, if the students were under 18 years of age, their respective parent(s)/guardian(s)). Participants were also provided with information about the questionnaire and interview process and an outline of what would be expected of their participation in the research study within the participant assent form. The researcher made periodic visits to each classroom over the course of 2 weeks to collect the signed consent forms.

Nonrandom sampling was used in the study because all the females within the school had an equal opportunity to be involved in the study. The population of the school was approximately 800 students, with approximately half being female. The resultant sample size of the study was 90 females ranging from grades 9 to 12.

### **Field Procedures**

On three or four different occasions over the course of 2 months, participants completed different components of the study during their lunches or period two classes. At the first three meetings, all participants completed all of the questionnaires. The last meeting occurred on an individual basis with 20 selected participants in an interview format. This allowed for further discussion and clarification of the questionnaire results. When the study was complete, all participants received a letter thanking them for their participation. Once the results were analyzed, the principal and board ethics committee were notified by email or telephone that the research findings were available for viewing. A full copy of the report was given to the school's main office for students to read and to have on record. Parents and students who requested a copy of the research findings were sent a summary document.

### **Instrumentation**

This study was designed to determine whether or not adolescent females who enrolled in high school courses that contained nutrition-related curriculum had improved nutrition knowledge, healthier eating habits, or a more favourable body image relative to adolescent females who do not enrol in these courses. The study was also designed to see if these variables were related to each other among adolescent females. To answer these questions, multiple measures were used including student profile cards, questionnaires, interviews, teaching materials, and curriculum documents. Specifically, the instruments used in this study were the student profile sheet, nutrition knowledge questionnaire, nutrition habits questionnaire, body image questionnaire, open-ended interview, lesson plans, student handouts, assessment and evaluation tools, and curriculum documents. In



this section, a detailed description of each instrument is provided, as well as information about their development.

### *Student Profile Card*

A student profile sheet was designed to provide the researcher with information about the specific participants (see Appendix A). The participants were assigned a research identification number, which was coded based on the participant's last name. Participants provided their current high school grade as well as information about whether or not they had taken secondary-level health and physical education, family studies, or science in which nutrition was discussed. Finally, participants were also asked to describe any other courses in which nutrition was part of the curriculum.

### *Nutrition Knowledge Questionnaire*

The first questionnaire that the participants completed was used to determine the participants' nutritional knowledge (see Appendix B). This questionnaire was adapted from one developed by Parmenter and Wardle (1999) to assess the general nutritional knowledge of adults. Modifications to the original questionnaire were made to reflect the high school curriculum. The first section of the questionnaire asked students to determine what type of nutrition advice experts chose to give them. The second section asked the participants to correctly classify different foods. The third section asked the participants about healthy food choices. The fourth section asked the participants about nutrition food labels. The last section asked the participants about how nutrition is related to health and disease. This questionnaire was field tested on adolescents who are similar in demography to the participants in the study. Modifications to the language and format of

the questionnaire were made based on the feedback received during field testing of the instrument.

Numerous studies have been critical of the validity and reliability of measurements in nutritional knowledge (Anderson, Umapathy, Palumbo, & Pearson, 1988; Shepherd & Towler, 1992). The nutritional knowledge questionnaire used in this study was adapted from the one created by Parmenter and Wardle (1999). The construct validity of the questionnaire was determined to be statistically significant at a  $p < 0.001$  level. The reliability of each section was determined using Cronbach's alpha. The correlations ranged from 0.7-0.97. Finally, Pearson's correlation was used to assess the test-retest reliability on the score of the respondents, who completed the questionnaire twice. This was determined to have an overall reliability of 0.98. The questionnaire was therefore determined to be statistically significant in terms of validity and reliability. (Parmenter & Wardle).

#### *Eating Habits Questionnaire*

The second questionnaire was used to analyze the nutritional habits of the participants in the study (see Appendix C). The questionnaire is adapted from a questionnaire by Turconi et al. (2003). The first section of the questionnaire asked participants to report their consumption frequency of certain foods. Foods and daily servings in question were reflective of the Canada Food Guide. Some questions were modified to be reflective of results from past research studies. For example, one question asked the participants about the number of daily servings of grains suggested by the Canada Food Guide. The participants were given options that are lower than those suggested by Canada's Food guide. This was done as a result of research into the

consumption of adolescent females grain consumption, which suggests that this group consumes four servings or less rather than the suggested (Department of National Health and Welfare; Health Canada, 2004). This questionnaire was field tested on adolescents who are similar in demographics to the participants in the study. Modifications to the language and format of the questionnaire were made based on the feedback that was received during the field testing of the instrument.

The nutritional habits questionnaire typically used to measure the effects of a nutritional program on eating habits are not always appropriate for the population or effective (Bingham, 1995). The instrument used in this study was adapted from the one created by Turconi et al. (2003). The results of the measure of Cronbach's alpha from the original questionnaire ranged from a minimum of 0.55 to a maximum of 0.75. Sections of the original questionnaire, specifically sections D, G, H, I, and J, were excluded from the questionnaire used in the study. When these sections are excluded, Cronbach's alpha scores range from a minimum of 0.59 to a maximum of 0.75. These data indicate an acceptable internal reliability for the instrument. For sections C and D, Pearson correlation was used to assess test-retest reliability on the participants, who completed the questionnaire twice. Scores ranged from a minimum of 0.78 to a maximum to 0.88. For section B, the Pearson correlation coefficients ranged from a minimum of 0.45 to a maximum of 0.90. These statistics indicated a good temporal stability and all Pearson correlation coefficients were statistically significant with  $p < 0.01$  (Turconi). The questionnaire was determined to be effective in determining the effect of nutritional intervention and school nutrition programs on the eating habits of adolescents.

### *Body Image Questionnaire*

The third questionnaire was used to determine the students' perceptions of body image (see Appendix D). The body image questionnaire was initially developed by Huddy, Nieman, & Johnson (1993). The participants were given 20 different statements relating to body image. The participants were asked to indicate whether they agreed, disagreed, or were unsure as to whether they agreed with the statement. The questionnaire also asked the students for a self-reported height and weight. This questionnaire was field tested on adolescents who are similar in demographics to the participants in the study. Modifications to the language and format of the questionnaire were made based on the feedback that was received during the field testing of the instrument.

A number of studies have examined the relationship between body image and a person's height and weight or their feelings towards particular parts of their body (Cash, 1990; Mahoney & Finch, 1976). To investigate the relationship of body fat and a person's body image, Huddy et al. (1993) designed a questionnaire to gauge whether the participants had favourable, neutral, or unfavourable body images. The instrument used to determine body image in this study was adapted from the one designed by Huddy et al. For their questionnaire, Huddy et al. determined that the "internal reliability using Cronbach's alpha was 0.72" (p. 853).

### *Open-Ended Interviews*

A series of interview questions were developed to assist in the discussions with participants (see Appendix E). The questions were designed to encourage open-ended responses by the participants. The questions were used as a guide; discussions were not

limited to the questions themselves. Interviews were transcribed using a professional transcriber. A transcriber confidentiality agreement was completed and signed by the transcriber to ensure confidentiality of the participants. The interviews provided further investigation into information that had come to light from the questionnaires. To ensure that the interview questions were clear and age-appropriate, they were field tested by the researcher in a series of mock interviews with students from another high school who are similar in demographic to this study's population. Modifications were made to some questions in order to make wording more clear to participants, based on feedback received during the mock interviews.

#### *Teaching Aids and Curriculum Documents*

Last, curriculum documents, course outlines, course handouts, teaching materials, and other course documents were collected that were reflective of the learning taking place in high school.

### **Data Collection**

Data collection occurred over a 2-month period on four different occasions in a variety of methods for the duration of the study. Data collection was comprised of the following methods: interviews, knowledge, habit and body image surveys, curriculum documents, and teaching aids. The qualitative data collected were rich and detailed in information and gave an all-encompassing view of the education received by students (Merriam, 1998). The qualitative data provided a statistical analysis of the knowledge and nutritional habits of the students. All participants completed three questionnaires, and some participants completed an interview.

After ethics clearance was received from the Brock University Research Ethics Board (see Appendix F) and the district school based research ethics board, females within the high school were given the information package. Signed consent forms were collected over a 2 week period. Participants were given the option to complete each component within class time or during their lunch hour. Arrangements were made with each affected teacher to excuse the students at the beginning or end of their period 2 classes. The dates on which the participants completed each component of the study were determined in consultation with the teacher to prevent interfering with classroom activities. Data collection occurred over the course of 5 weeks. The first questionnaire was administered to the participants over the course of 2 weeks. The second questionnaire was completed the following week, and all students completed it within 1 week. The third questionnaire was completed in the fourth week of the study. It took 1 week for all of the participants to complete it. For all questionnaires, participants were given approximately 25 minutes in which to complete them. Participants were given the option of additional time if required. No participants employed this option.

Before beginning each questionnaire, the participants were reminded that their participation in the research study was voluntary and that they would be identified only by their provided research identification number. Participants were also told that they could drop out of the study at any point without repercussions or penalties and any completed research data would be shredded and not used in the data analysis. Participants were informed that they would be able to obtain a copy of the results of the data collection within 3 months of the completion of data collection and a copy of the full report would be available after 6 months. Copies of the information would be available in

the main office of the high school or by contacting the researcher. Last, participants were given instructions pertaining to the questionnaire they were completing that day.

After all questionnaires were complete, they were collected by the researcher and the information was inputted into Microsoft Excel and later transferred into SPSS software. The participants were given a score based on their nutritional knowledge and habits. Participants were asked to complete an interview based on these scores. Participants were divided into four categories: high knowledge, high habits; high knowledge, low habits; low knowledge, high habits; low knowledge, low habits. In total 20 participants were interviewed, 5 from each category. Participants were not selected based on their grade level. Therefore participants from all grade levels were interviewed. Before the interview, participants were given the same instructions they had received before each questionnaire. They were also reminded that a transcriber would be used to transcribe the interview tapes but they would only be identified on tape by their research ID. The interviews took place in a private location. The interview was audiotaped using a cassette recorder. The tapes were coded and given to a transcriber to transform the data into written transcripts. The tapes and written transcripts were checked for accuracy by the researcher. Some changes were made to the transcripts by the researcher. Participants were invited to review the transcripts to ensure they reflected their thoughts and also make any desired changes or additions to their statements.

Interview questions were created based on the information collected from the questionnaires. During the interviews, some notes were taken, but the bulk of the data were collected by the tape recorder. Any notes taken during the interviews were incorporated into the transcripts.

Curriculum documents were collected from Ontario Ministry of Education publications. These documents provided information as to what knowledge secondary school students should have. Course outlines and teaching materials were collected from the secondary school teachers. These teaching materials included tests, class notes, activities, handouts, and textbooks. This information assisted in establishing a foundation of information from which the students are being taught. Both of these sources assisted in developing an understanding of the nutrition information to which the students are or should be exposed.

### **Data Processing and Analysis**

Several methods of data processing and analysis were used in this study. One of the goals of this study was to determine whether or not female adolescent students who are exposed to nutritional curriculum have an increased nutritional knowledge, better eating habits, or a more favourable body image. Quantitative methods were used to determine if there were differences to those who did not show any positive change in nutritional knowledge, eating habits, or body image. For this reason, questionnaires were used as well as curriculum documents.

Quantitative research can be defined as “a type of educational research in which the researcher decides what to study; asks specific, narrow questions; collects quantifiable data from participants; analyzes these numbers using statistics; and conducts the inquiry in an unbiased, objective manner” (Creswell, 2008, p. 46). Quantitative data were collected through the questionnaires and the curriculum documents. Software programs, SPSS and Microsoft Excel, were used to analyze the data.



Another goal of this study was to gain a deeper understanding of the participants' thoughts and feelings on the nutrition programs offered at a high school level and how education programs and the field of nutrition relate to them personally. For this purpose, qualitative methods were used in the form of personal interviews and teaching aids.

Qualitative research can be defined as

a type of educational research in which the researcher relies on the views of participants; asks broad, general questions; collects data consisting largely of words (or text) from participants; describes and analyzes these words for theme; and conducts the inquiry in a subjective, unbiased manner. (Creswell, 2008, p. 46)

Qualitative data were collected through interviews with the participants as well as through the teaching documents. The interviews were transcribed, and the participants' answers were analyzed for possible themes. Teaching materials were compared to the curriculum documents to see if any material provided to the students matched curriculum expectations.

Data collection and data analysis occurred simultaneously throughout the study. Data analysis began immediately after the first questionnaires were completed. The information collected through the questionnaires was used to select participants for interviews and identify any suggested changes to the questions. In addition, information gathered through the questionnaires and interviews were used to further generate questions for a second interview. The data processing and analysis of each instrument is described in this section.

### *Scoring the Nutrition Knowledge Questionnaire*

The nutrition knowledge questionnaire was used to measure the nutritional knowledge of the participant completing it. Each question had a correct and incorrect answer. Participants were also provided with an option to choose *not sure* if they did not know the answer. For each correct answer, a score of 1 was assigned. For every incorrect answer a score of -1 was assigned. If a participant gave an answer of *not sure*, a score of 0 was assigned. A total score was calculated for each participant. The highest possible score was 120. The results were used to rate each participant's knowledge as high, medium, or low. A high knowledge score was 90-120; a medium score was 61-89; and a low score was 0-60. The results were then compared with students' previous exposure to nutrition education through enrolment in high school courses containing nutrition curriculum. A Mann-Whitney test was conducted to determine whether or not further education in nutrition had contributed to increased nutritional knowledge. With more exposure to information, it could be argued that a person will gain more knowledge in the area. It was therefore important to determine if the participants who had taken courses with nutritional content also achieved a high nutritional knowledge score. If the argument was true, then a person who has not taken a course with nutritional content will have a lower knowledge than someone who has taken a course with nutritional content. If exposure to the course content has no influence on nutritional knowledge, it would indicate that the current curriculum is ineffective in increasing students' nutritional knowledge. The participants were also grouped by grade and the results were compared using the Kruskal-Wallis test to determine whether or not a relationship existed between nutrition knowledge and a student's grade. With age and maturity, it may be thought that

increased exposure to nutrition information may impact nutrition knowledge. If this were true, a person's nutrition knowledge should increase with an increase in his or her age or grade level.

#### *Scoring the Eating Habits Questionnaire*

Although nutritional knowledge is important, what a person does with this information is most important. For this reason, the participants' eating habits were examined to determine whether or not an increase in knowledge was related to healthier eating habits. Each question had three options: a healthy eating habit, a neutral eating habit, and an unhealthy eating habit. For a healthy eating habit, a score of 1 was assigned. For a neutral eating habit, a score of 0 was assigned. For an unhealthy eating habit, a score of -1 was assigned. A total score was calculated for each participant. The highest possible score was 40. The results were used to rate participants' eating habits as high, medium, or low. A high healthy eating habits score was 30-40; a medium score was 16-30; and a low score was 0-15. The results were then compared through a Mann-Whitney test to determine whether or not a relationship existed between students who had taken high school courses containing nutrition curriculum and healthier eating habits.

The results were also compared against the participants' nutritional knowledge to determine if participants with a higher nutritional knowledge had healthier eating habits. With a higher nutritional knowledge, it could be argued that a person will have healthier eating habits. It could also be suggested that the information learned within the classroom would be used to develop healthier eating habits. It was therefore important to determine if the participants who have taken courses with nutritional content and who have a high nutritional knowledge score are able to apply and translate the information learned into

healthier eating habits. If the argument were true, then a person who has not taken a course with nutritional content and has a lower knowledge will have less healthy eating habits than someone who has taken a course with nutritional content and has higher nutritional knowledge. If exposure to nutritional course content or having higher nutritional knowledge has no influence on eating habits, it would indicate that the current curriculum and knowledge taught is ineffective in assisting students in applying the information and translating it into healthier eating habits.

The eating habits questionnaire results were also compared to the participant's grade through the Kruskal-Wallis test. One's age may impact his or her own eating habits. As one ages, they may have more choice over the foods purchased in their household, or parents may have less of an impact on their children's eating habits. If these arguments are correct, then a relationship between a person's grade level and their eating habits will be present.

#### *Scoring the Body Image Questionnaire*

A healthy body image is important for every individual. It is thought that a healthy body image may be related to healthier nutritional habits. Furthermore, high school is thought to be a community supposed to nurture and assist students in developing positive body images and well-being. It is thought that adolescent females who continue to enrol in health and physical education classes will have a more positive body image than those who do not. Consequently, the participants' body images were examined to determine whether or not healthier eating habits were related to healthier body images and if continued enrolment in physical education classes was related to healthier body images. Participants were presented with 20 questions and were asked to

indicate if they agreed, disagreed, or were undecided about each statement. Participants who agreed with the statement were assigned a score of 1. Participants who disagreed with the statement were assigned a score of -1. Participants who were undecided about the statement were assigned a score of 2. A total score was calculated for each participant. The highest possible score was 40. The results were used to rate participants' body images as being favourable, neutral, or unfavourable. A favourable body image score was 45-60; a neutral body image score was 31-44; and an unfavourable body image score was 0-30.

The results were compared through a Mann-Whitney test to determine if a relationship existed as to whether or not the students who had taken high school physical education classes past the mandatory grade 9 level had a more favourable body image than students who did not. A Mann-Whitney test was also used to examine a possible relationship between participants' body image and their eating habits. Being comfortable with one's body is a component of the Ontario high school health and physical education curriculum. Studies have shown that females with increased participation in sport and physical education classes have been shown to improve their body image and well-being (Baum, 1998; Boyd & Hrycaiko, 1997; Calfas & Taylor, 1994; Modrein-Talbott, Pullen, Zandstra, Enhrenberger, & Muenchen, 1998; Steptoe & Bulter, 1996). One could contend that students who continue to enrol in physical education classes beyond the mandatory grade 9 level will have a more favourable body image than those who do not. In addition, with a more favourable body image, it could be argued that a person is more likely to feel better about their body and have better nutritional habits. If the argument is true, then a person who has taken physical education beyond grade 9 will have a more favourable

body image than those who have not. In addition, a person with a favourable body image will have healthier eating habits than someone who has an unfavourable body image.

The participants' body images were compared to their grades through a Kruskal-Wallis test to determine if any relationships existed between the two. One may suggest that a person may become more or less comfortable with their body image as they age. During adolescence, individuals are undergoing body changes and therefore may have differing comfort levels with their own bodies depending on age or grade. If this argument has merit, a relationship should exist between a participant and their grade level.

The participants were also asked to provide their self-reported weight and height. The heights given by the participants were translated into metres and the weights were translated into kilograms. This information and a Mann-Whitney were used to determine if there were any relationships between a person's height and weight with his or her body image, nutritional knowledge, and eating habits. A Kruskal-Wallis test was also used to determine if any relationships existed within the participants' grade levels.

#### *Open-Ended Interviews*

The open-ended interviews were used to gain a deeper understanding of the thoughts and feelings of the adolescent females with respect to their nutrition education. It was also an opportunity to have the participants discuss their nutritional knowledge, eating habits, and body image. Many participants expanded on the information that was given in the questionnaires. The entire interview was audiotaped.

A preliminary exploratory analysis of the transcripts was performed by reading through the transcripts to gain a general sense of the information. Notes of themes and

ideas were made in the margins of the transcripts. Data were grouped into themes and broad idea categories. From these identified concepts, a coding system was used to categorize the data. Each sentence of the transcripts with text segments was assigned a code word or phrase to accurately describe its meaning. If a text segment did not have a particular meaning related to the data analysis, it was not given a code.

After the entire transcript was coded, Excel was used to sort the codes in alphabetical order. This assisted in the identification of themes, patterns, and categories and in the highlighting of outliers.

To reduce the number of codes and establish a smaller number of themes or descriptions, all codes were examined for clusters or affinities, and those with similar or related key words were grouped together. Themes are similar codes amassed together to form a major idea in the data. Conversely, descriptions are details concerning people, places, or events in a qualitative research setting (Creswell, 2008). The emerging themes and descriptions were as follows: nutrition curriculum and programs in high school, the impact of friends, family, and sports, eating habits, body image, and the impact of the school cafeteria.

Finally, analyses of the descriptions and themes were performed in context of the literature, recommendations of the findings for practice, and further research.

#### *Teaching Material and Curriculum Documents*

Teaching materials were used to establish the types of materials the students had received in class. They also provided an understanding of the knowledge to which the students were being exposed and the types of activities in which they were involved.

Handouts, student assignments, teachers' notes, lesson plans, textbooks, and tests were some of the materials collected.

Curriculum documents were used to establish the provincial expectations of the knowledge and skills that the student should possess at the end of each course. Curriculum documents were examined in the areas of biology, health and physical education, and family studies. These subject areas were those indicated by the students in their student profile sheets of courses in which they had experience in nutrition education. The curriculum of these courses was used to create some of the instruments.

### **Assumptions**

There are a number of assumptions and limitations related to this study. First, it was assumed that all the participants participated in the study because they were interested in participating and not doing it to get out of class.

Second, it was assumed that all participants answered the questions honestly and to the best of their ability. Also, it was assumed that the participants were not being influenced by their peers and were giving answers that best reflected their nutritional knowledge, nutritional habits, and body image and not what was deemed to be socially accepted.

Third, it was assumed that the students knew what a typical serving size is for most foods. It was also assumed that the participants were able to identify the foods in question on the questionnaires, and if any participants did not know the foods, then they asked for clarification from the researcher.

Fourth, it must be acknowledged that for the participants who were enrolled in health and physical education class as well as other classes in which nutrition is taught,



the researcher did not know what teaching had occurred. In some cases, teachers may have had to rush through or skip material because of time constraints, and therefore some material may not have been taught. Also, since this study is occurring after most of the courses have been taught and most teachers teach multiple sections of the same course, some teachers may not be sure what was taught to each class. Therefore, it was assumed that all classes were taught the same material. Further, it was assumed that the teaching material given to the researcher is reflective of the material used and knowledge taught in class.

Last, it was assumed that the scheduling and location of the classes during the day as well as the semester do not impact student attitude and knowledge. Some participants may have had the class in the morning and others in the afternoon. In addition, some participants may have taken the course in the first or second semester. It is assumed that the courses offered the same learning experience regardless of the time of day or semester in which a class was taught.

### **Establishing Credibility**

Validity and reliability of instruments and findings are essential to establishing the credibility of a study. In this study, several methods were used to establish credibility. These included testing the instruments prior to beginning the study, collecting data using multiple methods in order to establish triangulation, and transcript checking the interviews with the participants.

Reliability of an instrument “means that the scores from an instrument are stable and consistent” (Creswell, 2008, p. 169). Validity of an instrument “means that

individual's scores from an instrument make sense, are meaningful" (Creswell, p. 169).

Further, it enables the researcher to draw meaningful conclusions from the sample.

All of the questionnaires used in this study were modified from previous studies. Due to some changes in the content and design of these instruments, the nutritional knowledge questionnaire, the nutritional habits questionnaire, and the body image questionnaire were field-tested through pilot tests prior to the start of the research. Pilot tests were conducted for this study to ensure understanding of the questionnaires and interview protocols used for and by the study's participants. Creswell (2005) defines a pilot test as a "procedure in which a researcher makes changes in an instrument based on feedback from a small number of individuals who complete and evaluate the instrument" (p. 367). The individuals involved in the pilot test were adolescent females from another high school. They were similar in demographics to the study's sample. After the pilot test took place, modifications were made to the tools. This ensured that the questions were age appropriate and were easy to understand. This added trustworthiness to the study, which is important in qualitative research. Trustworthiness establishes the research outcomes as credible, valid, and reliable (Bassey, 2003; Hoepfl, 1997). The validity and reliability of each instrument are described in this section.

Another way this study established credibility was to use multiple measures to collect data. This provided an opportunity to establish triangulation, which is used to ensure the accuracy and credibility of the study's findings. It is "the process of corroborating evidence from different individuals, types of data, or methods of data collection in descriptions and themes of qualitative research" (Creswell, 2008, p. 266). For each participant, multiple sources of data were collected. The information collected

from the questionnaires, interviews, teaching documents, along with curriculum documents contributed in the triangulation of data and the validation of the study's findings. The multiple sources of data provided an opportunity to substantiate the findings.

In addition, credibility of the study was also established through member checking of the transcripts from the participants' interviews. Each interviewed participant was provided the opportunity to review her transcribed data. Modifications and additions were made to ensure they accurately reflected her thoughts, ideas, and feelings.

Threats to internal and external validity have been minimized because the study occurred over a short period of time and the sample of the population is similar in demographic. Additionally, the same questionnaires were given to all participants, who received exactly the same instructions from a script prepared by the researcher, participants were given the same amount of time to complete the survey, and were all supervised by the same person.

### **Ethical Considerations**

This study involved human participants and therefore an ethics review was completed both through the Brock University Research Ethics Board and through the District School Board Research Ethics Board where the study took place. The Application to Conduct Research within the school board was submitted to the District School Board in February 2008. Following approval from the school board, the application for Ethics Review of Research with Human Participants was submitted to the Brock University Research Ethics Board in March 2008. The Brock University Research

Ethics Board cleared the study on April 24, 2008 (see Appendix F). The District School Board Research Committee approved the study on February 20, 2008.

Due to the nature of the study, ethical considerations were given to the informed consent, participant assent, participation withdrawal, interference with academics, confidentiality, and anonymity.

### *Informed Consent*

Personal consent is the participant's agreement that she will contribute to the research. With respect to this study, consent was obtained from the principal, parents, and students. A meeting took place between the principal and the researcher to discuss the research, particularly, methodology and research procedures, and their impact on the school, students, and teachers. The principal was given copies of all instruments and documentation to be used during the research process. Permission was granted by the principal to conduct the research within the school.

Each teacher within the school was informed about the methodology of the research and the impact it would have on his or her classes. The research was designed to accommodate teachers and classroom practices as well as minimize interference to classes. Some teachers did not give consent for students within their classes to participate during class time. Alternative times were made available for these students to participate out of class.

Each parent and student was given a letter of invitation to inform them about the study. The parents and students also received two copies of an informed consent form so that one could be returned to the researcher and the parents could keep one for their records. Parents were asked to sign an informed consent form on behalf of their child that

acknowledged their understanding of the research, recognized their child's role in the study, and granted permission for their child to participate in the study. The students also signed the form to acknowledge their agreement to participate. Any students 18 years of age or older were allowed to sign their own form without parental consent.

The informed consent form had two sections. The first section outlined details about the study and contact information of the researcher. The second section had an area where the participant and their parents signed their name to acknowledge their participation in the study. One copy of the informed consent form was returned to the researcher; the other copy was kept by participants for their own records.

#### *Participant Assent*

Before the students participated in the research, they completed a participant assent form. This form was to ensure that the students were reminded of their role in the research and were aware of their rights and responsibilities.

The participant assent form had two sections. The first section had contact information of the researcher and outlined the rights, responsibilities, and role of the participant in the research. Participants were given a copy of this form upon request.

#### *Participant Withdrawal*

Participation in the research study was optional for all participants. The participants were notified on the consent form and participant assent form about their right to withdraw from the study at any time and for any reason. Participants were informed that if they were to withdraw from the study, their data would be destroyed and not used in the final data analysis. Before beginning the study, the participants were again informed of this right through the verbal instructions given to all participants.

### *Interference With Academics*

The principal researcher was a teacher within the school where the research took place. The researcher did not teach any of the courses related to the research. The principal researcher was the classroom teacher for some of the participants within the study. All of the students in the researcher's classes were informed that they would not be treated differently based on their participation in the research study. Participants were also informed that there would be no penalty for participants who chose to participate and then decided to withdraw.

The research was conducted in a manner that did not in any way place participants at a disadvantage and did not intentionally affect them academically. Arrangements were made with the classroom teachers to ensure that participation in the study did not interfere and affect the students academically. Participants who were concerned about missing time to complete the research study were given time at lunch to participate. The participants in the study had already completed the course and their marks would have been submitted before the results of the data analysis were made available.

### *Confidentiality and Anonymity*

Confidentiality and anonymity are an important part of ethical research with human participants. Several steps were taken to protect the privacy and right of the participants. These included safe storage of data, coding of instruments, and the use of pseudonyms.

In this study, no confidential information revealed by participants was shared with anyone except the researcher. To keep the information confidential, several precautions were taken. All questionnaires and cassette tapes were stored in a secure location. To

protect the data, only the researcher had access to this location. After the analysis of this material, it was kept in a locked safe. All electronic data were stored on a password-protected computer.

To maintain confidentiality, all interviews were conducted in a private location. To keep the content of the interviews private, the transcriber of the interviews signed a confidentiality agreement. This agreement acknowledged that the transcriber would keep the information secure and destroy all information once the transcriptions were turned over to the researcher. All tapes and written material were returned to the researcher.

In this study, anonymity was maintained by removing any distinctive character or recognition factor from the instruments collected. To maintain anonymity, student participants were assigned a research ID, coded by their last name. These research IDs were kept on a file stored in a password-protected computer. The student profile sheets containing each participant's name and research ID were kept in a separate location from any of the research instruments. The research ID was placed on all instruments used in the study and was used to identify participants on audiotapes, in interviews, and on written transcripts. Names of participants do not appear in the written or oral dissemination of the research.

In the reporting of the study, participants are described collectively and in general terms (e.g., adolescent females). As well, the name of the school is not reported in the findings. Only general descriptions of the site (e.g., geography, size, location in Ontario) are reported.

## **CHAPTER FOUR: PRESENTATION OF THE RESULTS**

Adolescence is an influential time in a person's life. It is a time when lifelong habits may be developed or fine-tuned. Although nutritional knowledge may not be considered essential to some people, it could be argued that it is necessary to develop healthy eating habits and a healthy lifestyle. One's nutritional knowledge and eating habits may also have impacts on other aspects of a person's life, specifically one's body image. This study compared the nutritional knowledge, eating habits, body image, height, and weight among students who have taken health and physical education beyond the mandatory grade 9 courses, students who have taken other courses in which nutrition was part of the curriculum, and those who have not been exposed to nutrition curriculum in high school. Furthermore, this study examined whether differences existed among students of different grade levels with regard to nutritional knowledge, eating habits, body image, and height and weight of students. Specifically, the question investigated was "does an increased exposure to nutritional education have an effect on a student's knowledge, eating habits, and body image?"

The design of the study was based on the consideration of a number of previous studies. Instruments for collecting data which had been used and validated in previous research studies were used in this study. Modifying these pre-existing instruments allowed for the collection of a large amount of data and provided validity for the collected data. A comparative analysis of the data collected from the nutrition knowledge questionnaire, the nutrition habits questionnaire, and the body image questionnaire revealed the effects nutrition knowledge, eating habits, and body image have on each other in addition to the effects these factors have on students with or without exposure to



high school nutrition curriculum. A comparative analysis was also performed to determine if any variation occurred among students of different grade levels. Further investigated were the obstacles faced by adolescent females when trying to understand nutrition, develop healthy eating habits, develop a favourable body image, and navigate eating inside and outside of the school environment. The purpose of this investigation was to reveal improvements or changes in current school nutrition programs and the school environment.

Participants in the study were females in grades 9-12 from a public school in southern Ontario. All participants completed three questionnaires, and some selected participants completed an interview. The nutrition knowledge, nutrition habits, and body image questionnaires were measured using a rating scale. The quantitative data were analyzed using Excel and SPSS. As well, the obstacles faced by the adolescent females when trying to understand nutrition, develop healthy eating habits, and develop a favourable body image were documented using interviews. These qualitative data were coded to identify common themes. In addition to this methodology, teaching aids and curriculum documents were used to understand the students' exposure to nutritional knowledge and the type of delivery and instruction that they received. These qualitative data were coded to notice common themes.

The research findings are examined in this section. The results have been organized under the participants, nutritional knowledge, healthy eating habits, body image, participants' body mass index, and differences among the groups.

### **The Participants**

Of the 90 participants who completed the questionnaires, 41 (45.55%) were currently enrolled in a course or had been enrolled in a high school course that contained curriculum in which nutrition education was a component. The remaining 49 (54.44%) of the participants had not taken a course in high school in which nutrition was taught.

Of the 90 participants who completed the questionnaires, 33 (36.67%) were currently enrolled or had been enrolled in a physical education course beyond the mandatory grade 9 course. The remaining 57 (63.33%) were not currently enrolled or had not been enrolled in a physical education course beyond the mandatory grade 9 course.

Of the 20 participants who were interviewed, 15 (75.00%) were currently enrolled in a course or had been enrolled in a high school course that contained curriculum in which nutrition education was a component. The remaining 5 (25.00%) of the participants had not taken a course in high school in which nutrition was taught.

Of the 20 participants who were interviewed, 10 (50.00%) were currently enrolled or had been enrolled in a physical education course beyond the mandatory grade 9 course. The remaining 10 (50.00%) were not currently enrolled or had not been enrolled in a physical education course beyond the mandatory grade 9 course.

The grade level of the participants varied from grades 9 to 12. The grade level of participants who completed each qualitative and quantitative component of the research is stated in table 1.

### **Tests of Normality and Homogeneity**

The Kolmogorov-Smirnov test was performed on all the data to determine whether the data were normal. The Kolmogorov-Smirnov test “compares the score in the

Table 1

*Grade Level of Participants Completing Quantitative and Qualitative Data*

| Grade level       | Grade 9 | Grade 10 | Grade 11 | Grade 12 |
|-------------------|---------|----------|----------|----------|
| Quantitative data | 30      | 6        | 42       | 12       |
| Qualitative data  | 2       | 4        | 13       | 1        |

sample to a normally distributed set of scores with the same mean and standard deviation” (Field, 2005, p. 93). When the data were tested as a whole, it was determined that nutritional knowledge and food habits were significant with a score of  $p < 0.05$ . The rest of the data were determined not to be statistically significant with a score of  $p > 0.05$ .

Levene’s test was performed on all data to determine their homogeneity. Levene’s test “tests the hypothesis that the variances in the groups are equal” (Field, 2005, pp. 97-98). The test was performed on untransformed data and transformed data (to the natural log). It was determined for all of the data that  $p > 0.05$ , which indicates the null hypothesis must be accepted because the difference between the variances is zero.

As a result of the normality and homogeneity testing, nonparametric testing was performed on the data.

### **Nutritional Knowledge**

Each participant completed a nutrition knowledge questionnaire. An overall score was given to each participant. Of the participants, only one (1.11%) received a high score for nutritional knowledge. Nineteen (21.11%) received a medium score for nutritional knowledge. The remaining 50 (77.78%) received a low score for their nutritional knowledge. The nutritional knowledge of all the participants was compared to a number of aspects of the data collected during the study. These are discussed below.

#### *Exposure to Nutritional Curriculum*

It is thought that the more a person is exposed to any information, the more likely he or she will remember and retain it. There are a number of high school courses in which a person could enrol and therefore have exposure to nutrition curriculum. Science, health and physical education, and family studies were the three subject areas that the

participants from this study indicated were courses in which they were currently enrolled or in which they had been enrolled that contained components of nutrition education. A Mann-Whitney test was performed to determine if students who had taken a high school course which contained a component of nutrition had an increased nutritional knowledge over those who had not taken a course containing nutrition curriculum. Students who had taken a course that contained nutritional curriculum ( $Mdn = 52$ ) had significantly higher nutritional knowledge than those who had not been exposed to high school nutrition curriculum ( $Mdn = 37$ ) ( $U = 750.500$ ,  $p < 0.05$ ,  $r = -0.22$ ).

Students who continue to enrol in health and physical education beyond the mandatory grade 9 course are exposed to more nutritional information than those who do not. A Mann-Whitney correlation test was used to determine if students who had taken health and physical education beyond grade 9 have better nutritional knowledge than those who had not. Physical education students ( $Mdn = 49$ ) did not differ in nutritional knowledge when compared to all other students ( $Mdn = 44$ ) ( $U = 900.500$ , ns,  $r = -0.04$ ), no significant differences were found.

However, age and maturation may also play a part in a person's increase in nutritional knowledge. A Kruskal-Wallis test was used to determine if a student's grade level had an impact on her nutritional knowledge. The findings revealed that, overall, grade level significantly affected nutritional knowledge ( $H(3) = 16.830$ ,  $p < 0.001$ ). When grade 9 participants were compared to other grade levels, there was no significant difference between grade 9 and 10 participants, but there were significant differences with grade 11 participants ( $H(3) = 7.294$ ,  $p < 0.05$ ) and grade 12 participants ( $H(3) =$

16.830,  $p < 0.01$ ). There were no other significant differences between any other grade levels.

### **Healthy Eating Habits**

Healthy eating habits are imperative to establishing a healthy lifestyle. Ensuring that your body is obtaining all of the required nutrients is especially important during the adolescent years because the body is developing and growing. It is critical that female adolescents are taught healthy eating habits because they are at a very impressionable age and it is a time in their lives when lifestyle habits can be established. Of the 90 participants who completed the nutrition habits questionnaire, 2 (2.22%) had high healthy eating habits, 49 (54.44%) had average healthy eating habits, and 39 (43.34%) had low healthy eating habits. The healthy eating habits of all the participants were compared to a number of aspects of the data collected during the study. These are discussed below.

#### *Exposure to Nutrition Curriculum*

With an increased exposure to nutrition curriculum, a person may have increased nutritional knowledge. Although a person may have increased knowledge in an area of study, she may not be able to apply that knowledge and integrate it into her everyday life. A Mann-Whitney test was used to determine if students who had taken a course with nutrition curriculum ( $Mdn = 12$ ) had healthier eating habits than those who had not taken one ( $Mdn = 10$ ). Findings revealed no significant difference ( $U = 750.500$ , ns,  $r = -0.20$ ).

#### *Health and Physical Education*

One aspect of health and physical education class is to assist students in establishing a healthy lifestyle. Part of a healthy lifestyle is healthy eating habits. A Mann-Whitney test was used to determine if students who enrolled in health and physical

education courses beyond grade 9 ( $Mdn = 11.5$ ) had healthier eating habits than those who did not ( $Mdn = 10$ ). Results indicated that those taking physical education beyond grade 9 had significantly better nutrition habits ( $U = 677.500, p < 0.05, r = -0.23$ ).

### *Grade Level*

A person's age may have an impact on his or her food choices. At an early age, parents play a significant role in their children's food choices. As students age, they may have more influence or control over their food choices. They may pack their own lunches, assist in grocery shopping, or buy their own food outside of the home.

A Kruskal-Wallis test was used to determine if a student's grade level and age have an impact on her eating habits. When all grade levels were compared, a significant difference was found among the grade levels ( $H(3) = 8.55, p < 0.05$ ).

When grade 9 participants were compared to grade 10 participants ( $H(3) = 4.54, p < 0.05$ ), grade 11 participants ( $H(3) = 8.67, p < 0.05$ ) and grade 12 participants ( $H(3) = 8.55, p < 0.05$ ) significant differences were found.

When grade 10 participants were compared to grade 11 and 12 participants, there were no significant differences.

When grade 11 and 12 participants were compared, no significant difference was found.

### **Body Image**

One's body image is an indication of a person's perceptions of his or her own body. Analysis was performed to determine if there were any correlations between a person's body image and nutrition habits as described above. This study aimed to determine if girls' body image is related to other aspects of their lives as described below.

### *Health and Physical Education Class*

A favourable body image for an adolescent female is often difficult to achieve. It is the goal of educators to assist adolescents in developing a favourable body image. Aspects of the health and physical education curriculum are introduced to assist students in developing a healthy body image. Studies have shown that women who participate in sports and physical activity have a more favourable body image (Marsh, 1994; Richman & Shaffer, 2000). To examine this, a Mann-Whitney test was used to determine if students who continue to enrol in physical education beyond grade 9 ( $Mdn = 42.5$ ) have a more favourable body image compared to those who do not continue to enrol in physical education ( $Mdn = 41.5$ ). The results showed a significant difference between those participants who have taken physical education beyond grade 9 and those participants who have not ( $U = 701.00, p < 0.05, r = -0.21$ ).

### *Exposure to Nutrition Curriculum*

Although the results stated above suggest that eating habits are not correlated with a more favourable body image, exposure to nutrition curriculum may be related to a more favourable body image. Some components of the nutrition curriculum discuss what nutrition is needed to be healthy. This may have an impact on a person's body image. A Mann-Whitney test was used to determine if students who had nutrition curriculum in their high school courses ( $Mdn = 12$ ) have a more favourable body image than those who have not ( $Mdn = 10$ ). The findings show that there is no significant difference ( $U = 834.50.00, ns, r = -0.05$ ).



### *Grade Level*

A person's age may have an impact on his or her body image. As students age, their body will undergo many changes, and this may have an impact on how they feel about their bodies. Furthermore, peer pressure may become more of an influence on a person's body image. A Kruskal-Wallis test was used to determine if students' grade levels and ages have an impact on their body image. When all grade levels were compared, no significant difference was found among the grade levels.

When each individual grade level was compared to all other grade levels, no significant differences were found.

### **Body Mass Index**

A person's body mass index is an indicator of a person's overall health. Taking each participant's body weight in kilograms and dividing it by her height in metres squared is how her body mass index was calculated. Standardized percentile curves of body mass index have been developed that are age specific for children and adolescents (Hammer, Kraemer, Wilson, Ritter, & Dornbusch, 1991). Medical professional guidelines suggest that a person who has a body mass index below 18 is considered underweight. A person with a body mass index falling between 18 and 24 is considered normal, and anyone with a body mass index greater than 24 is considered overweight (Massachusetts General Hospital, 2008). There are, however, inconsistencies and problems with the body mass index; for instance, athletes or those with a large amount of muscle will have a skewed body mass index. In addition, adolescents who are still growing may have a skewed body mass index (Massachusetts General Hospital). However, for the average person it is considered to be a standard measure used by health

professions. Health professionals have used an individual's body mass index in a number of different contexts. An adolescent's body mass index can be used as a measure of adiposity and obesity (Hammer et al.). Furthermore, body mass index can be used as an indicator of a person's probability of becoming obese as an adult (Guo, Wu, Cameron Chumlea, & Roche, 2002).

Of the 90 participants who completed the body image questionnaire, two students abstained from completing the questions asking about their height and weight. Of those who did answer the questions, 13 or 14.77% had a body mass index below 18, 60, or 68.18% had a body mass index between 18 and 24, and 15 or 17.04% had a body mass index greater than 25. The body mass indexes of the participants were compared to a number of aspects of the data collected during the study. These are discussed below.

#### *Current Nutrition Curriculum*

As a part of nutrition education, educators may discuss aspects of a healthy lifestyle such as exercise and healthy eating habits. For the average person, if he or she establishes a healthy lifestyle, his or her body mass index should reflect that.

A Mann-Whitney test was used to determine if students who had nutrition curriculum in their high school courses ( $Mdn = 20.82$ ) had a lower body mass index than those who had not ( $Mdn = 20.38$ ). The findings show that there is no significant difference ( $U = 791.500$ , ns,  $r = -0.16$ ).

A Mann-Whitney test was performed to determine if students who enrolled in health and physical education courses beyond the grade 9 ( $Mdn = 20.5$ ) had a lower body mass index than those who had not ( $Mdn = 21.5$ ). The findings show that there is no significant difference ( $U = 898.000$ , ns,  $r = -0.09$ ).

### *Grade Level*

A person's age may have an impact on his or her body mass index. As students age, their bodies undergo a number of physical developmental changes. A Kruskal-Wallis test was used to determine if students' grade levels and ages have an impact on their eating habits. When all grade levels were compared, no significant difference was found among the grade levels.

When grade 9 participants were compared to grade 10 ( $H(3) = 4.687, p < 0.05$ ) and grade 11 participants ( $H(3) = 5.992, p < 0.05$ ), significant differences were found. However when grade 9 participants were compared to grade 12 participants, no significant differences were found.

When grade 10 participants were compared to grade 11 and 12 participants, there were no significant differences.

When grade 11 and 12 participants were compared, no significant difference was found.

### **Differences Between the Two Groups**

Two discriminate analyses were performed using SPSS and are described below. The first discriminate analysis was to determine if the dependent variable-whether or not students had taken health and physical education beyond grade 9—was influenced by any of the following independent variables:

1. Nutritional knowledge questionnaire score
2. Eating habits questionnaire score
3. Body image questionnaire score
4. Body weight in kilograms

5. Height in metres

6. Body mass index

The Test of Equality of Group Means shows whether or not there is a statistically significant difference between the means of the dependent variable for each independent variable (George & Mallery, 2006). The Wilks' Lambda test was used to determine if the means of each group (those who had taken health and physical education beyond grade 9 and those who had not) are equal. A Wilks' Lambda score of 1 indicates that the group means are equal and the variation is not explained by the differences between the two groups (George & Mallery). The participants' nutritional knowledge had a score of 0.997 with a significance of 0.612; body weight had a score of 0.996 and a significance of 0.559; height had a score of 0.993 with a significance of 0.454; and participant BMI had a score of 0.999 with a significance of 0.783. All these Wilks' Lambda scores are close to 1.00 and their corresponding significance is greater than 0.10, indicating that the means of the groups are close to being equal. The participants' eating habits had a score of 0.941 with a significance of 0.023 and body image had a score of 0.949 with a significance of 0.035, indicating these results are statistically significant to a  $p < 0.05$  level. The  $F$  value for these two variables were 5.39 (eating habits) and 4.58 (body image). A large  $F$  value (greater than 3) indicates that the between groups mean square is larger than the within groups mean square (George & Mallery). This additionally confirms that there is a significant difference between the individuals who took health and physical education and those who had not.

The second discriminate analysis was to determine if the dependent variable—whether or not students have been exposed to nutrition curriculum—was influenced by any of the independent variables.

The Wilks' Lambda test was used to determine if the means of each group (those who have been exposed to nutrition curriculum and those who have not) are equal. The participants' nutritional knowledge had a score of 0.964 with a significance of 0.076; body image had a score of 0.980 with a significance of 0.190; body weight had a score of 0.984 and a significance of 0.242; height had a score of 0.988 with a significance of 0.300; and participant BMI had a score of 0.974 with a significance of 0.135. All these Wilks' Lambda scores are close to 1.00 and their corresponding significance is greater than 0.10, indicating that the means of the groups are close to being equal. The participants' eating habits had a score of 0.954 with a significance of 0.045 indicating this result is statistically significant to a  $p < 0.05$  level. The  $F$  value for this variable was 4.14 and the  $F$  value for nutritional knowledge was 3.23. A large  $F$  value (greater than 3) indicates that the between groups mean square is larger than the within groups mean square (George & Mallery, 2006). This additionally confirms that there is a significant difference for eating habits as well as nutritional knowledge between the individuals who were exposed to nutritional curriculum and those who were not.

### **Interviews With Participants**

In this study, the questionnaires were used to gain an understanding of the knowledge, behaviours, feelings, attitudes, backgrounds, and experiences of the participants. The information collected helped to establish whether or not there were differences between participants based on their educational experience. The results of

these questionnaires can contribute to an understanding of current nutrition education and school practices. The interviews provided an opportunity for the participants to expand on the data from the questionnaires.

The interviews also provided the participants with an opportunity to further discuss their experiences with nutrition inside and outside the high school. Major themes developed from the analysis of the interview data were school programs, family, friends, school cafeteria, and involvement in extracurricular activities and competitive sports. Minor themes developed from the major themes and are listed in table 2.

### *School Programs*

Teachers are given guidance about what to teach through the curriculum established by the provincial government. The curriculum is designed to teach students information that is important to their everyday life or educational career. Although school programs attempt to meet the needs of all students, this is not always possible. A number of the participants felt that the nutrition information taught in school was very repetitive and minimal in its content. The participants also spoke about the difficulties that they had in the application of the knowledge. They felt that the emphasis in the classroom was on knowledge and not necessarily skills. Although the two go hand in hand, the participants considered skills to be more important for their age group. The skills such as learning portion sizes, cooking skills, or knowing what to order from a restaurant were suggestions the participants made.

In addition, the participants felt that they were given a broad overview of nutrition information and were not given details about the effects that nutrition has on their bodies or long-term effects of proper or improper nutrition. One participant felt that if students

Table 2

*Overview of Identified Themes*

| Major theme                                       | Minor themes (subthemes)  |
|---|---|
| School programs                                   | Current secondary school curriculum; changes the participants would make; effects on eating habits; application of school programs. |
| Family  | Eating habits; lifestyle; knowledge   |
| Friends   | Eating habits; peer pressure; knowledge   |
| School cafeteria                                  | Food choices; changes to the cafeteria  |
| Extracurricular activities and competitive sports | Eating habits; external influences  |

were aware of the effects, they would be more willing to make changes to their eating habits.

Every participant who was interviewed believed that nutrition education in high school should be mandatory. They felt nutrition was important for every student to learn about, and it would help some students in developing healthier eating habits. As one participant explained “I would like to see the food class almost become a mandatory class that we have to take just because it is so informative of what and how you should eat and how it affects your body and shows what needs to be done to live a healthy life.” For some high school students it would be hard to incorporate another class into their time schedule. One participant suggested that nutrition be incorporated into the grade 9 health and physical education curriculum because everyone has to take the course and this might spur some interest in nutrition. Some participants were involved in a nutrition club in elementary school. Students in this club would meet once a week to learn how to cook a meal, and the nutritional elements of the meal were discussed while preparing and eating it. Every participant who had experience in these clubs felt that they were enjoyable and educational.

Acknowledging other cultures and embracing diversity in lifestyles were other suggestions that 4 of the participants made. One participant felt that a lot of the information learned in schools was not applicable to her because she does not eat a typical Canadian diet. She had difficulty extrapolating the information learned in class and applying it to her life. She felt that school would be an ideal setting to assist her in developing understanding of her cultural diet as well as exposing her classmates to other cultural foods. Three other participants felt that the information and skills learned in



school did not acknowledge the differences in lifestyles that people have. Many of the participants involved in the study are active in extracurricular activities and have part-time jobs. This often meant that they missed eating with their family and made it difficult for them to eat consistent meals. As a result, they ate at fast food places or ate the most convenient thing they could make or find. These participants felt that the school could assist them in developing tricks and ideas that were flexible and would work for their lifestyles.

The school in which the research took place hosted an all-day health fair for its students. Two participants commented that they found the health fair to be very beneficial and learned a lot about nutrition. The students were able to pick the sessions that they wanted to attend. This enabled the students to pick aspects of health, some of them being nutrition, about which they wanted to learn. The participants spoke about being given nutritional handouts, taking them home, and using these handouts at a later date when they had some nutritional questions.

Critical thinking is a skill that can be helpful when a person is faced with nutritional information. On a daily basis, most people are bombarded with nutrition information through the media, in the grocery store, or through the people with whom they interact. When the participants were asked if they would further investigate a nutrition claim that may be presented to them, none indicated that they either had in the past or felt that they would in the future. One participant said the reason that she would not conduct a further investigation was that she did not feel that she would be able to determine what nutrition information is true and whether or not a source of information is credible. Two other participants remarked that it would be helpful for schools to teach

students how to determine whether or not a source of information is credible as well as how someone can determine whether nutrition information is fact or fiction.

### *Family*

Most participants who were interviewed had discussed nutrition with their families and felt that their families, specifically their mothers, are a strong influence on their nutritional habits. When possible, all participants ate dinner with their parents. Extracurricular activities, part-time jobs of their own, or siblings' jobs were cited as reasons why the participants would not be able to eat dinner with their families. Parents' jobs were also given as an influence on mealtime. One participant spoke about her parents working shift work and therefore not being home for dinner. This usually required the participant to make her own dinner or eat out.

Most participants felt that their mothers were primarily responsible for the meal planning and grocery shopping for the entire family. However, all participants said that they had influence over what groceries were bought for the house, and their requests for foods were usually fulfilled. With respect to meal planning, 15 of the 20 interviewed participants felt that they frequently gave input into what foods were served at dinner.

One participant acknowledged that her parents' health was a big influence in her nutritional knowledge and family eating habits. Some participants acknowledged that when their mothers learned new nutritional information, whether it was from work, a new diet program, a nutritionist, or a cooking class, their mothers tried to pass this information along to their daughters.

For 2 participants, healthy eating and nutrition education has been ingrained into their families' ways of life since they were young. One of these participants described her

mom's lessons on Canada's Food Guide and the use of a daily value chart on the family's fridge to track the number of servings from each food group that all of the family members were eating to ensure they were meeting the requirements. As described by 1 participant, "my mom taught me the difference between good carbs and bad carbs, and she's taught me all the difference food groups and how many you need, and we have a daily value chart on our fridge to make sure we were getting them in every meal."

However, that was not always the case for some of the interviewed participants. One participant spoke about her family's eating habits during her childhood. Her father did not feel that lower fat food options tasted as good as the fuller fat foods, so the family always ate foods that were higher in fat. When the participant's father's health changed and required him to eat lower fat foods, the family made the change, and now the family prefers the lower fat options. This participant felt that if people do not know any better, they will continue to eat the foods to which they are accustomed from childhood. She felt it would be beneficial for students to be introduced to these healthier options so they know that healthy eating tastes good.

All interviewed participants recognized that they eat better with their family than when they are alone or with their friends. When asked about the influence of others on their eating habits, 1 participant explained, "when I'm with my family I eat a lot better than if I were to eat by myself or with friends." One participant commented that her mother would be upset if she were made aware of the amount of junk food that her daughter ate while at school or with friends.

Family was also given credit for supporting some participants in being vegetarian. All 3 of the vegetarian participants who were interviewed felt that they would not be able to maintain their lifestyle if it was not for the support of their family.

A family's culture and religion was cited as having a big impact on 1 participant's eating habits. In her religion, meat plays an important part of every meal. This often meant that meals were deficient in vegetables. Although the participant acknowledged that she knew that her family should incorporate more vegetables into her diet, she did not foresee her family making changes any time soon.

### *Friends*

Half of the participants who were interviewed felt that their friends strongly influenced their eating habits. Furthermore, all participants admitted that they ate less healthy with their friends when compared to eating with their family or by themselves. One participant mentioned that a typical weekend night would be to buy junk food with her friends and watch a movie. Another participant stated that her friends often give her junk food and she found it hard to resist. She indicated, therefore, that she eats junk food that she would normally not buy herself. Other participants spoke of examples of friends influencing them to buy junk food from the cafeteria or when they were out for lunch.

Friends can have a positive effect on a student's nutrition. One participant spoke of discussing nutritional information with a friend who was more knowledgeable. This participant felt more comfortable asking her friend about it and learned more because she felt her friend made the information more relatable. Another participant spoke of learning better eating habits from a friend who suffered from health problems and had to change her diet as a result.

Friends can also be a support system for one another. One participant spoke of her friends helping each other to eat healthier. When they eat out at a restaurant, they encourage each other to make healthier choices. As one participant described, “we’ll listen to each other like ‘oh you are right, that’s not good for me, I should eat something else.’”

### *School Cafeteria*

The school cafeteria is a source of breakfast, lunch, and snacks for some students. It is open before school and closes by the end of the lunch period. All of the participants interviewed had eaten at the school cafeteria at some point during their educational career. Fifteen of the 20 participants interviewed indicated that they eat food from the school cafeteria at least once a week. All of the interviewed participants agreed that it was difficult to eat healthy at school. All participants with the exception of 1 admitted that when buying food from the cafeteria, they usually choose French fries, fried chicken burger, hamburgers, cookies, or candy. One participant said that all the unhealthier options were just too tempting. All participants said that they would be more likely to eat in the cafeteria if healthier options were available. Three participants mentioned that if there were only healthy choices available for students to purchase, they would not have any other choice and would eat the healthier options. One participant said she would like “an expanded salad bar with pasta salad or fruit salads and good sandwiches.” Another felt that small changes could be made such as “having grilled chicken burgers instead of fried chicken burgers.”

Although the school cafeteria sells some packaged foods which are labelled with the nutritional information, the prepared food does not have any of that information

listed. It was suggested by 1 participant that the cafeteria staff should post the nutritional information for each of their products so that the students can be more aware of what they are eating and can make informed choices. One diabetic participant explained that it would be easier to choose food given the information and that the cafeteria should have “an area where they could give a printout of the information and it would be easily accessible. If students choose to forgo the information and make less healthy choices, the participant felt that at least they were given the information and could make an informed choice.

Two of the interviewed participants were vegetarians and acknowledged they had a very difficult time eating healthy at the cafeteria. One participant was frustrated that most of the food offered at the cafeteria contained meat. Although vegetarian sandwiches are available for purchase, the participants spoke of those particular sandwiches being difficult to obtain because very few are made on a daily basis. The participant emphasized her point by commenting that it would often be a race to the cafeteria at lunch in order to be one of the first vegetarians there.

If students do not want to buy their lunch at the cafeteria, they are limited as to what they can bring because their food would sit in their locker for at least 3 hours before they can eat it. One participant suggested that a refrigerator could be put in the school cafeteria for students to store their lunches and snacks. This would enable students to bring a wider variety of foods.

When the cafeteria is not open, students are able to buy snacks and beverages from the vending machines within the school. The vending machines are stocked with pop, juice, Gatorade, water, chips, candy, and other snack foods. One participant spoke

about the difficulties of finding a healthy after-school snack within the school. She said that if there were healthier options such as milk, pretzels, and fruit, she would take advantage of them.

### *Involvement in Extracurricular Activities and Competitive Sports*

The primary reason that students attend school is for the teaching and learning which occur inside the classroom. However, there are also many extracurricular activities outside the classroom in which students have the opportunity to become involved. Some of the participants in the school felt that these activities often interfered with their eating habits. Some of the extracurricular activities occur at lunch hour, which makes it difficult for some of the participants to eat lunch. These participants spoke of having to buy whatever was easiest to eat on the go, try to eat lunch during class if the teacher permitted them, or, at times, even skip lunch altogether. For the extracurricular activities that occur before school, some participants discussed that they were unable to eat breakfast so early in the morning because they were either rushed to get to the activity or did not feel like eating so early. If possible, some participants said that they would eat some breakfast before class: either something they had brought from home or buy a donut or muffin from the cafeteria. Furthermore, some participants who were involved in extracurricular activities after school hours found it difficult to find healthy snacks to eat unless they brought them from home. In this particular school, the cafeteria closed after lunch, so if students did not bring snacks from home, they would either have to buy them from the vending machines or variety store across the road from the school. Seven of the interviewed participants expressed frustration in the lack of healthy snacks available to them during all hours of their school day.

Eight of the participants who were interviewed were involved in competitive sports inside and outside the school environment. These participants did not feel as though the current curriculum or school programs accurately met their needs. They felt that the information taught in the classroom was more of a general overview and did not discuss the specific needs of an athlete. All of the study's participants who participate in competitive sport did not feel like they were adequately prepared to eat properly for their sports. Two of these participants sought advice from nutritionists and dieticians, and they credited them for increasing their nutritional knowledge and assisting them in establishing healthier eating habits. One participant said that she "saw a dietician in Toronto who designed an eating plan that was conducive of elite training for skating." These participants found it very helpful to have an overall assessment of their lifestyles and then be given specific individual suggestions for improvements. It was suggested by one participant that there should be specific nutrition curriculum geared towards athletes in the class, especially when nutrition is discussed in health and physical education class.

### **Nutrition Curriculum and Teaching Materials**

The curriculum documents were used to gain a further understanding of the exposure to and interaction with nutritional information that high school students have. The Ontario government has established a curriculum for each subject and grade level. Teachers use the curriculum documents as guidelines to determine expectations of the students' knowledge and skills. A teacher's interpretation of the Ontario curriculum may vary from teacher to teacher, which is why teaching materials were also used as a source of data. The secondary school courses that the participants acknowledged as having nutrition curriculum were grade 10 and 12 health and physical education, grade 10 foods



and nutrition (within the realm of family studies), and grade 11 biology. This information was examined to determine the content and to what extent secondary students receive nutrition curriculum.

With respect to the curriculum, some differences between the three subject areas can be found. However, there is also overlap of some material and areas in which information may be lacking. When examining the teaching materials, it was found that the information given to the students was age appropriate and easy to comprehend. However, many of the activities were not very applicable to the students' everyday lives. In this section the different subject areas with respect to teaching materials and curriculum are discussed.

#### *Health and Physical Education Curriculum Documents*

One component of the health and physical education curriculum in grade 10 is to explore the relationship between healthy eating, physical activity, and body image. In addition to this, students have to develop strategies and ideas for a healthy lifestyle rather than focusing on one's body weight. Students are to evaluate their current lifestyles and are encouraged to make changes which would promote healthy eating and physical activity. Another aspect of the curriculum is to have the students explain how healthy eating is beneficial to physical activities and look at the effectiveness of different types of resources and support services related to healthy eating. Last, students are required to explain the risks of dieting and other unhealthy eating behaviours for controlling weight (Ministry of Education and Training, 1999d)

Nutrition is also discussed within the curriculum of the grade 12 exercise science course. Within the biological basis of movement unit, an overall expectation of the

students is for them to demonstrate an understanding of the ways in which nutrition and training principles affect human performance. A more specific expectation for the students to understand is the relationship between nutrition and activity such as caloric and nutrient balance. In addition, students are to analyze the effects of nutritional performance-enhancing methods or substances on one's athletic performance (Ministry of Education and Training, 1999b).

### *Health and Physical Education Teaching Documents*

Within the grade 10 health and physical education, body image is a topic that is discussed extensively. Students self-administer a questionnaire to judge their personal body image. The media and outside influences on a person's body image and perceptions of beauty are discussed. Students complete a project analyzing current advertising and how it may affect a person's body image.

Fad diets are discussed, and students create a poster or prepare a presentation to discuss and share the information with their classmates. Students do a number of different activities that focus on the physiological and psychological effects that dieting and unhealthy eating behaviours have on an individual.

Students discuss and perform an activity on estimating their daily caloric requirements and body mass index. This leads into the students tracking their eating habits for 1 to 3 days and then analyzing their eating habits.

Students receive lecture-style instruction and answer questions on food labels, individual serving sizes, Canada's Food Guide, vitamins and minerals, and the uses, kinds, and required daily intake of carbohydrates, protein, and fat.

Additionally, students are given a number of nutrition articles and answer questions based on the articles. These articles range from vegetarianism to the benefits of fruits and vegetables.

Within the grade 12 exercise science course, students receive lecture-style instruction and answer questions on the role of nutrients, especially carbohydrates, protein, fat, water, minerals, and vitamins on one's body systems and physical activity. Students examine serving sizes and food sources of specific nutrients while relating them to commercial food labels.

Students also read articles, discuss case studies, and answer questions related to nutrition and its relation to physical performance.

#### *Biology Curriculum Documents*

Nutrition is discussed in the internal systems and regulation science unit of grade 11 biology (university preparation). An overall expectation is for students to be able to evaluate the impact lifestyle decisions have on a person's health. A specific expectation in this course is for students to be able to describe the importance of nutrients and digestion in providing people with the needed energy for growth. Students are to understand the role of carbohydrates, proteins, and fats in the many body processes. Furthermore, students are required to analyse and explain any societal needs that have led to scientific and technological developments related to internal systems. This can include, for example, why societal desire to maintain wellness has led to the development of dietary products or supplements (Ministry of Education and Training, 1999c).

Within the grade 11 biology (college preparation) course, there are two units in which nutrition is discussed. These units are animal anatomy and physiology and environmental science (Ministry of Education and Training, 1999c).

A specific animal anatomy and physiology unit gives the students an opportunity to examine and evaluate the influence media has on an individual's attitude towards nutrition. For example, students are required to discuss societal beliefs of saturated or unsaturated fat based on media influence (Ministry of Education and Training, 1999c).

Within the environmental science unit, students are expected to use energy pyramids to explain distribution, production, and use of food resources in a food chain. For example, students are required to use an energy pyramid to illustrate human consumption of foods (Ministry of Education and Training, 1999d).

#### *Biology Teaching Documents*

Within the grade 11 biology (university preparation) course, nutrition is discussed in the context of macromolecules and their uses for the body. Students take notes and receive lecture-style instruction on the uses of carbohydrates, proteins, and fat within the body. Students also participate in labs to identify carbohydrates, proteins, or fat.

In the grade 11 biology (college preparation) course, nutrition is discussed in more detail. Students take notes, receive lecture-style instruction, and answer questions on energy needs, basal metabolic rate, Canada's Food Guide, vitamins, minerals, fats, carbohydrates, and protein. Students perform activities in which they need to be able to read food labels and break down the individual components. Another activity that the students perform is to record a food journal and analyze their eating to determine if they are meeting their calorie and nutritional needs. Students also perform numerous labs

ranging from identifying nutritional substances to the digestion of nutrients. Last, students perform case studies on topics ranging from dieting to genetically modified foods.

### *Family Studies Curriculum Documents*

Within the family studies realm, the grade 10 food and nutrition course curriculum contains a number of different expectations related to nutrition. In the self and others unit, the overall expectations require students identify reasons for a person's food choices and complete an assessment of the importance of meeting the food needs of other family members. Specific expectations within this unit students are required to analyze the food needs of individuals of different ages, schedules, food preferences, and health concerns and to determine how to meet these different needs. Students have to explain the reasons, such as cultural, nutritional, environmental, why people may eat the foods that they do. Students also explain family, peer, and media influence on an individual's good choices and eating habits. The curriculum also requires students to describe the effect of early childhood eating habits on one's eating habits and nutrition (Ministry of Education and Training, 1999e).

The overall expectations for the personal and social responsibilities unit require the student to analyze the responsibilities involved in maintaining nutritional health and well-being. Students are also required to demonstrate the skills required to produce healthy and appetizing food for themselves and others. A specific expectation is for students to identify nutrients along with their sources for maintaining good health at different stages of the life cycle. Students are to explain the purpose of food guidelines such as Canada's Food Guide. The curriculum requires that students evaluate their own

personal eating habits, use appropriate food guides to plan a meal, analyze the relationship among eating breakfast, attitudes, and school performance, and describe the effects of food habits on physical, emotional, and psychological well-being. Another component of the curriculum requires students to examine Canada's food grading practices, identify organic foods and food labelling regulations and terms, and identify different types of dietary regimens and the reasons behind these dietary choices. Students are also expected to describe the influence of media and advertising on food choices (Ministry of Education and Training, 1999e).

Within the social challenges unit, body image is discussed. Overall expectations for this unit are for students to analyze the concept of body image and its relationship to eating disorders and body-altering substance abuse as well as demonstrate an understanding of how to make informed food decisions when dealing with stressful situations (Ministry of Education and Training, 1999e).

Specific expectations in this unit are for students to describe unhealthy eating patterns and body-altering substance abuse such as eating disorders, identify strategies for correcting unhealthy eating habits and body-altering substance abuse, and demonstrate an understanding of the influence of role models in helping youth feel comfortable about their bodies. Students also identify techniques for reducing the percentage of fat content in a person's diet (Ministry of Education and Training, 1999e).

#### *Family Studies Teaching Documents*

In the grade 10 foods and nutrition course, nutrition is a heavy component, and students do a vast assortment of activities within each unit. Within the first unit, students investigate the influences on an individual's food preferences. Students also discuss the

importance of breakfast and healthy breakfast options.

Later in the course, students take notes, answer questions, and receive detailed lecture-style instruction on protein, fats, carbohydrates, and vitamins. Specifically, students learn about the sources of these foods, daily food requirements, and the roles that these nutrients play in the body. In addition, the students use this information and analyze food labels on commercial products.

Canada's Food Guide is discussed in great detail in this course. Students examine each category of the food guide. The students are required to determine how many daily servings from each category a person requires and what food sources would contain the different categories.

Eating disorders are a topic of study within the course. Students receive lecture-style instruction, answer questions, and have class discussions on the different eating disorders and the current issues pertaining to them in Canadian society.

Within the course, students are often given articles or case studies related to nutrition and are required to answer questions pertaining to these articles and studies.

Throughout the course, students participate in food labs and get practice planning and preparing meals. For some labs, students analyze the nutritional contents of the food or a recipe and are required to think of healthier options or change their food preparation to meet healthier requirements.

### **Summary of the Chapter**

The three different questionnaires that each participant completed provided data that could be analyzed to determine any relationships among nutrition education,

nutritional knowledge, eating habits, body image, school grade level, and body mass index.

With respect to relationships revolving around nutritional knowledge, a statistically significant difference was found in the nutritional knowledge of students who have taken a course involving nutrition education when compared to the knowledge of those who have not taken a course with nutrition curriculum. In addition, there was statistically significant difference between the nutritional knowledge and school grade level. Specifically, there were differences between grade 9 and grade 11 participants as well as between grade 9 and grade 12 participants.

Regarding relationships associated with eating habits, a statistically significant difference was found between students who take health and physical education beyond grade 9 compared to those students who do not continue in health and physical education. Statistically significant differences were also found between eating habits and school grade level. Differences were explicitly found when grade 9 participants were compared to participants in all other grade levels.

Concerning relationships linked with body image, a statistically significant difference was found between students who take health and physical education beyond grade 9 compared to those students who do not continue in health and physical education.

Pertaining to relationships between a person's body mass index, statistically significant differences were found between grade 9 and grade 10 participants as well as between grade 9 and grade 11 participants.

The interviews provided an opportunity to analyse the findings to determine any major emerging themes. In this chapter, these themes were presented (see Table 2) and



discussed. The themes were organized under the following five headings: school programs, family, friends, school cafeteria, and involvement in extracurricular activities and competitive sports.

The theme that focused on school programs revolved around four issues of consideration: the current secondary school curriculum, changes the participants would make, effects on their eating habits, and the application of school programs. Although some of the participants' opinions in these areas varied, all participants felt that there are changes that could be made to the current school programs and that nutrition education should be mandatory for all secondary school students. When considering the theme of family, the following three subthemes emerged: eating habits, lifestyle, and knowledge. All participants agreed that their families played a big part either directly or indirectly in their eating habits, lifestyle, and knowledge. Within the theme of friends, the three subthemes were identified as eating habits, peer pressure, and knowledge. With the exception of 2 participants, all interviewed participants felt that their eating habits were worse when they ate with their friends. The school cafeteria was identified as another major theme, with food choices and changes that the participants would like to see introduced to the cafeteria as the two subthemes. All interviewed participants felt that their school cafeteria lacks healthy eating options, and each participant had her own idea as to changes she would like to see implemented. Last, the final identified theme was extracurricular activities and competitive sports, with the subthemes identified as eating habits and external influences. A number of participants who were involved in competitive sports felt as though their nutritional knowledge and eating habits were improved as a result of being involved in competitive sports.

The curriculum documents for all three subject areas indicate that there is some overlap of curriculum expectations among the subject areas. All of the subject areas examine the media's role on an individual's nutrition. In addition, all three subject areas in some form explore an individual's energy consumption needs and requirements.

There are many differences among the subject areas. Within health and physical education, there is more of an emphasis on how nutrition is related to physical activity. Also, students are required to explore the relationships among body image, nutrition, and physical activity. In family studies, students are required to differentiate the caloric and nutrient needs for different life stages. There is also an emphasis on social and cultural effects on an individual's food choices and habits. In biology, the process of digestion is broken down and examined by the students. The effects of technology on nutrition are also a component of the curriculum.

When examining the teaching materials used by the teachers within the class, there are some similarities among the different subject areas. All classes use Canada's Food Guide as a guideline for healthy eating habits for the students. All of the teachers instruct the students in the basics of key nutrition items such as carbohydrates, fats, proteins, vitamins, and minerals. Similarly, all the teachers require the students to read nutrition articles from various media sources and answer questions based on those articles, other case studies, or information provided through in-class lectures.

However, each course has its own unique activities. Unique to health and physical education is the focus on a healthy body image and the effects of nutrition on physical activity. Science incorporates labs into its classroom activities. In family studies, students get the opportunity to prepare food and create their own meals and snacks.

## **CHAPTER FIVE: SUMMARY, DISCUSSION, AND IMPLICATIONS**

Nutrition education is thought by some to be one of the top priorities of the current education system (Mandell, 1993). Healthy eating habits and proper nutrition are considered to be essential for overall health and wellness of children and can be related to their school performance (American Dietetic Association, 1999; Aldinger & Jones, 1998; Nicklas, Webber, Johnson, Srinivasan, & Berenson, 1995). Moderate undernutrition can have effects on a child's cognitive development and school performance (Center on Hunger Poverty and Nutrition Policy, 1995). Missing breakfast can affect a student's performance in problem-solving tasks and increase his or her absenteeism and tardiness (Meyers, Sampson, Weitzman, Rogers, & Kayne, 1989; Pollitt, 1995; Pollitt, Leibel, & Greenfield, 1981; Pollitt, Lewis, Garza, & Shulman, 1982-83).

Schools provide an excellent environment in which nutrition can be at the forefront and students can practice healthy eating. In the United States, more than half of the students eat one of their three meals at school; what's more, 1 in 10 of these students eat two of their three meals at school (Dwyer, 1995).

In the current North American society, there has been an increase in the number of single-parent homes, homes with two working parents, and the availability of fast food. With these changes, the ability of parents to monitor their children's eating habits has decreased (Crockett & Sims, 1995), and thus nutrition education programs are becoming increasingly important. Evaluations of school-based nutrition education programs have shown improved eating behaviours of their students (Contento et al., 1992; L. Lytle & Achterberg, 1995). Information-based school nutrition programs have

been shown to increase the nutrition knowledge of its students (Killen et al., 1993; D. Neumark-Sztainer et al., 1993; Paxton, 1993).

Within the school environment, classroom lessons may not have enough of an impact on the students' eating habits to have a lasting effect (Society for Nutrition Education, 1995). It is necessary for students to also have access to healthy foods and a support system around them (Contento et al., 1995). This information alludes to the need for a comprehensive school health program. The influence of a school goes beyond the walls of a classroom and includes the verbal and nonverbal cues from peers and adults concerning foods and eating habits. Messages delivered inside the classroom are more likely to be strongly received by the students when they are consistent and reinforced outside the classroom in the school environment (Center for Disease Control and Prevention, 1997).

With a comprehensive school nutrition program, students are not only assisted with the knowledge, attitudes, and skills necessary to make healthy food choices, but they are also provided with an environment that is supportive, motivating, and provides the services necessary to develop and maintain healthy behaviours (Resnicow, 1991). Within a school, students would not only receive nutrition curriculum within the classroom, but they would also have benefits such as a cafeteria serving healthy foods, assistance from community groups, available nutrition counselling, and health programs for the faculty and staff (Allensworth & Kolbe, 1987).

The purpose of this study was to investigate the impact that the current curriculum has on adolescent females' nutrition knowledge, eating habits, and body image. In order to accomplish this, 90 female students accepted an invitation to participate in this study.

The range of exposure to nutrition education for the participants was from a number of different courses with nutrition curriculum to no nutrition education at all. Students were divided into three different groups: those who had not taken a course with nutrition curriculum, those who had taken health and physical education beyond grade 9, and those who had taken a course other than health and physical education beyond grade 9 that also contained nutrition curriculum. Questionnaires were administered to all of the female participants, who ranged in grade level from grade 9 to grade 12. Twenty students were selected for an interview based on their high or low questionnaire scores. Ontario Ministry of Education issued curriculum documents as well as each individual teacher's tests, handouts, class assignments and course outlines from all affected courses were analyzed to determine the course material and curriculum that were being delivered to the students.

### **Summary of the Study**

The adolescent female students participating in this research study did not have a specific treatment carried out on them. The participants may or may not have been previously enrolled or were currently enrolled in a school course which contained nutrition curriculum. Students who had not been exposed to nutrition curriculum acted as the control group in this study. The data collected were based on the participants' present knowledge, thoughts, attitudes, and feelings. The concept of the research study was that the students' nutrition knowledge, eating habits, and body image would be influenced by whether or not they had taken a course with nutrition curriculum.

The first requirement of this study was to determine from past research studies what resounding effects nutrition education may have on a high school student. It was

ascertained that the nutrition education might increase a student's nutrition knowledge, eating habits, and body image. Once these topics were determined, the need for the development of questionnaires to collect data was mandated. The questionnaires needed to be valid and reliable. In addition, body image can be a sensitive topic for adolescent females, and this required diligence in creating a questionnaire which would not be uncomfortable to complete for those involved. Questionnaires from three different previous studies were modified and field-tested to ensure validity and reliability. The nutrition knowledge questionnaire was adapted from the one developed by Parmenter and Wardle (1999). The food habits questionnaire was adapted from the questionnaire designed by Turconi et al. (2003). The body image questionnaire was modified from a questionnaire initially developed by Huddy et al. (1993). Students also completed a participant profile card to determine the extent of their exposure to nutrition education. Those who had been exposed to nutrition education were compared to those who had no exposure to nutrition education based on their nutritional knowledge, eating habits, body image, and body mass index to determine if there were any significant differences between the treatment and control groups.

In addition to questionnaires, 20 of the participants were interviewed. The participants were chosen to be interviewed based on their questionnaire scores. All students were asked similar questions, and additional questions were gauged based on their answers to the interview protocol. The interviews provided the participants an opportunity to expand on their knowledge, feelings, thoughts, and attitudes which were touched upon in the questionnaires.

The results of the study suggest that the current nutrition curriculum does increase the students' nutrition knowledge for those who enrol but does not always translate into healthier eating habits. These results are similar to Rabe, Ohri-Vachaspati, and Scheer (2006), who found that when administered nutrition education, the participants had an increase in nutrition knowledge but did not have a change in their nutrition-related behaviours. The results of this study for students who enrol in health and physical education are contrary to Rabe et al., as the participants in that study did not have an increased knowledge but did have healthier eating habits. These results are similar to studies which have found that people who are more physically active are more likely to have healthier eating habits (Blair et al., 1985; Pate, Heath, Dowda, & Trost, 1996; Simones et al., 1996).

A statistically significant difference was found between nutrition knowledge and school grade. The 2004 National Nutrition Programme Baseline Survey of adolescents in Bangladesh found that there is an increase in nutrition knowledge with age (ICCDDR B, 2004). In the context of this study, the older participants may have more exposure to nutrition curriculum because there are more courses containing nutrition curriculum in grades 10, 11, and 12 than in grade 9. Students have more opportunities to enrol in these courses, which could contribute to their increased knowledge.

Students who enrolled in health and physical education beyond grade 9 were found to have a more favourable body image. These results are consistent with those of Marsh (1994) and Richman and Shaffer (2000), who found that women who participate in sports and physical activity have a more favourable body image.

In this study, a significant relationship was found between age and healthier eating habits. No present studies have examined the relationship between age and healthier eating habits in adolescent females.

The results of this study from the comparison of body mass index show that there is a significant relationship between age and body mass index. This may be related to the physical changes that adolescent females undergo during this stage of their lives (Mann & Truswell, 1998). The results also demonstrate that there is no significant relationship between body mass index and nutritional knowledge. These results mimic those of O'Brien and Davies (2007) and Thakur and D'Amico (1999), who found no correlation between nutrition knowledge and body mass index in adults or adolescents.

From the information collected through interviews with the participants, most of the participants were satisfied with the instruction they received within the classroom. However, the participants would like to see changes in the school environment outside of the classroom such as healthy food in the cafeteria. The suggestions made by the participants are indicative of those within a comprehensive school nutrition program. The participants also discussed the influence of family and friends, which have been proven in past research studies to be strong influences on adolescents nutrition (Croll, Neumark-Sztainer, & Story, 2001; Klesges, Stein, Eck, Isbell, & Klesges, 1991; Shaw, 1998). Participants also spoke of the effect sports and other extracurricular activities have on their nutrition. No present research has examined this issue.

Examination of the government-issued curriculum documents as well as teaching documents provided insight into the extent and type of nutrition education the participants may have been exposed to. The outcome of this analysis revealed some



overlap and similarities between the different subjects and courses, such as understanding the basic facts of the main macro- and micronutrients. Some gaps in knowledge and skills which would be helpful for students to learn and be exposed to were also revealed. For example, none of the course curriculum requires students to learn the long-term effects of poor nutrition or the skills necessary to eat healthy at a restaurant.

From the analysis of all the data collected, emergent categories and themes were evident. The validity of the findings resulted through the triangulation of the data collected from the three questionnaires, the interviews, the government-issued curriculum documents, and the teaching documents.

### **Discussion**

In this section, the results of the present study are examined to understand not only the current nutrition knowledge, eating habits, and body image of adolescent females but also the effectiveness of current curriculum and school practices and the implications of them. To start this examination, the nutrition knowledge of the participants is explored. This is important because it provides insight into the current nutrition knowledge of adolescent females, which can assist in determining whether the current curriculum and school practices assist in increasing the students' knowledge. After an examination of the nutrition knowledge of the participants, the eating habits of the participants are explored. This provides an understanding as to whether or not the current nutrition curriculum and school practices and environment are assisting students in developing healthy eating habits. The participants' body images are considered to determine any relationships this may have with the participants' nutrition. Last, current school programs and the school environment are discussed.

### *Nutrition Knowledge*

The nutrition knowledge of the participants was primarily collected through the nutrition knowledge questionnaire. The nutrition knowledge questionnaire contained questions which are reflective of general nutrition knowledge and knowledge that would assist in developing healthy nutrition habits. Some nutrition knowledge was gauged for some participants through the interviews. The results from the questionnaires showed significant differences between those participants who have taken a course with nutrition curriculum and those who had no exposure to nutrition curriculum. This result does not come as a surprise. When students are exposed to more nutrition curriculum, their knowledge should be greater than those who have not had nutrition curriculum in high school. A number of studies of nutrition intervention and nutrition education programs have shown that with an increased exposure to nutrition knowledge, the participants had increased amount of nutrition knowledge (Powers, Struempler, Guarino, & Parmer, 2005; Shariff et al., 2008; Yoon, Yang, & Her, 2000). Although in this present study the participants showed an increased knowledge, overall, few participants scored high on the questionnaire. So although the participants who had exposure to nutrition curriculum did have an increased knowledge, their knowledge is not as vast as it could be. One reason for this may be that the participants may not have been taught some of the information which was on the questionnaire. Or they have may have been taught it but may have forgotten aspects of it. For some of the participants, it may have been 1 or 2 years since they last took a course containing nutrition curriculum. A participant echoed this sentiment during the interviews. She felt that a lot of the information taught in the classroom is often forgotten because it is not discussed or used after the course is done. If

students were continually reminded of the information inside or outside the classroom, or were even able to apply the information to their lives outside the classrooms, they might have more confidence in their knowledge and retain the information longer.

When the knowledge of the participants who took health and physical education beyond grade 9 was compared to all other participants, there was no significant difference in their nutritional knowledge. A healthy lifestyle is a point emphasized in a health and physical education class. In grade 10, nutrition education is a core area of study for one of the three health units. With the emphasis of a healthy lifestyle throughout the semester, it was thought that their nutrition knowledge might be greater and have more longevity than other courses. Perhaps the nutrition curriculum is delivered over a small time frame and the students may have forgot some of the information. In this high school, for each topic of health education, 1 week of the semester is devoted for each topic. Also, it may have been a while since the participants were enrolled in the health and physical education course and may not have taken any other nutrition course since then. So although the health and physical education participants had a higher knowledge than other participants who had no exposure to nutrition curriculum, their knowledge does not exceed those who have taken other courses which contain nutrition curriculum.

The results from the comparisons of the participants' school grade and nutrition knowledge suggest that age does play a role in nutrition knowledge. When compared to all of the school grades, there were significant differences between grade 9 and grade 11 and 12. No present grade 9 courses in Ontario contain nutrition curriculum. It is only in grade 10 that students have the option to take a course which may contain nutrition curriculum. Although students are exposed to nutrition curriculum in elementary school,

the amount they receive may be dependent on their elementary school or classroom teacher. One of the participants interviewed spoke of belonging to a cooking club in her elementary school and having a high exposure to nutrition education. Conversely, another participant could not remember a time in which nutrition education was discussed in great detail in elementary school. She felt that her teacher may not have had a lot of knowledge in the subject matter and may have skipped it because the teacher did not feel comfortable teaching it. Additionally, as a student moves through the grades in high school, they may take more and more courses which contain nutrition curriculum. From this information, it is reasonable to state that the nutrition information increases as a student progresses through high school, which may be due to a lack of exposure. The limited exposure grade 9 participants may have impacts their nutrition knowledge. The lack of difference between the grade 9 and grade 10 participants could be attributed to the fact that some of the grade 10 participants had not taken a nutrition course or were currently enrolled and had not been exposed to the nutrition education or were planning on taking the course in grade 11.

From the interviews, suggestions for changes in the school programs to assist in increasing students' knowledge were given by some participants. Many of the interviewees felt that the information discussed in class was repetitive and boring. Nutrition information learned in one class may be also examined in another. One participant spoke of not putting forth any effort to learn the material because it was repetitive and not a challenge. Although examination of the curriculum documents shows that there are differences in the curriculum guidelines, examination of the teaching documents shows that the material taught by the classroom teachers is in fact similar in

some areas (Ministry of Education and Training, 1999b, 1999c, 1999d, 1999e). These similarities in the classroom teaching may impact the students' learning in the classroom. If the lessons taught in the classroom are similar and the students are not being challenged, this may result in some of the students being bored and unengaged. However, the repetitiveness of the information may contribute to some students' increased nutrition knowledge compared to those who had not taken a nutrition course (Widhalm, 2007).

Another point brought to light through the interviews was the difficulty some participants had in remembering the nutrition information they had been taught. The lessons delivered by the classroom teacher may not have an impact on the students or may not be meaningful to them. This could give rise to and account for the students being less likely to remember them (Widhalm, 2007).

The source of the students' nutrition knowledge cannot always be accounted for. Although school is a place for significant learning, learning also occurs outside the classroom. It is therefore reasonable to assume that some of the participants may have increased nutrition knowledge for reasons besides the nutrition curriculum they may or may not have received. Some of the interviewed participants spoke of nutrition knowledge being passed on to them from their parents or friends. Others were given knowledge from an outside source such as a coach or a dietician. Some other interviewed participants spoke of doing research into nutrition before they decided to become vegetarians.

### *Healthy Eating Habits*

The eating habits of all the participants were collected through the eating habits questionnaire. The eating habits questionnaire asked questions to determine the current

eating habits of the participants and whether or not these eating habits are considered to be healthy. The eating habits of some participants were further explored through the interviews.

The results from the questionnaires showed no significant differences in healthy eating habits between those participants who have taken a course with nutrition curriculum and those who had no exposure to nutrition curriculum. These results are not entirely, and perhaps unpretentiously, unexpected. In the interviews, participants spoke of the classroom activities being very knowledge based, and the participants experienced difficulty applying the knowledge outside the classroom. After examination of the teaching documents and curriculum documents, one must acknowledge that there is little application of the knowledge outside the classroom. Some of the assignments, such as the food diary, which are assigned and are required to be completed by the students are beneficial and have merit. In some cases, these diaries are used to assist a person to lose weight or understand his or her eating habits. However, students can use these diaries to become more consciously aware of the food that they are eating (Hollis et al., 2008). There might be a disconnect between the information learned in the classroom and being able to apply it and use it in the world outside the classroom. With the exception of the family studies courses, none of the other courses contain hands-on applications such as preparing foods. This may make it difficult for a student to translate the nutrition knowledge into choosing healthy snacks or preparing healthy foods. Students may not make healthy food choices because they are not aware of the benefits of nutrition. One participant suggested that if students were aware of the long-term effects of poor nutrition, such as heart attacks or effects to one's physical appearance, the students may

be more willing to make the necessary changes. Many students and even adults are unaware of the immediate risks or effects of unhealthy eating habits such as dental caries, bone health, iron deficiency, obesity, eating disorders, and poor school performance (Centers for Disease Control and Prevention, 1996; Story, 1992). Unfortunately with some aspects of nutrition the effects of poor nutrition may be internal and therefore difficult for an individual to see, or they may not be seen on one's outward appearance for a number of years. These can include osteoporosis for low calcium intake, heart disease from a high fat intake, or obesity from eating too many calories (Centers for Disease Control and Prevention).

When participants who had enrolled in health and physical education beyond grade 9 were compared to all other participants, a statistically significant difference was found in the participants' eating habits. This result was fairly astonishing when one considers that the health and physical education curriculum does not require a lot of application of the material. However, two past studies have found high correlations between the lack of physical activity and unhealthy eating behaviours among adolescents (Lytle et al., 1995; Neumark-Sztainer et al., 1997). Students who enrol in health and physical education classes are physically active for 65 to 70 minutes each school day. This daily physical activity may influence the students to have healthier eating habits.

Also, health and physical education aims to instil respect for a healthy lifestyle in its participants. Healthy eating habits can be considered a significant component of a healthy lifestyle. It could be considered that students who continue to enrol in health and physical education beyond the mandatory grade 9 course may be more athletic and may be involved in extracurricular sports outside of school which may require them to have

healthier eating habits to contribute to their athletic performance. Another rationale may be that these particular participants may already lead a healthy lifestyle, which would suggest they might already have healthy eating habits without the influence of the health and physical education curriculum. Some of the participants who took health and physical education and who were also involved in athletics spoke of the influence of their coaches and dieticians in their food choices.

When comparisons were done between all of the different school grades, it was revealed that significant differences were present between the grade 9 participants and all other grade levels. This difference could be explained that as students age they may have more of an influence on their eating habits than when they were younger. This might translate into the students making their own meals or having input into decisions as to what groceries are purchased or what meals prepared for the family. All of the grade 11 and 12 students who were interviewed spoke of either doing the grocery shopping or having impact on the foods that were purchased. None of the grade 9 participants felt that they had impact as to the food choices of their household. This type of influence is not uncommon; in the United States, adolescents directly influence approximately \$19.6 billion of household spending on groceries (Channel One Network, 1997). Studies have found that there has been an increase in the number of adolescents who grocery shop, with more than half of adolescent girls and a third of adolescent boys in the United States completing their family's weekly grocery shopping (Zollo, 1999).

Younger students, 12-14 years of age, are more likely than older students, 15-17 years of age, to eat foods in the home and are therefore more influenced by their parents or the food choices available (Channel One Network, 1998). Another explanation could



be that students may become more aware of their eating habits as they age and may make healthier choices. Moreover, the nutrition knowledge questionnaires showed a significant relationship between nutrition knowledge and age. This suggests that as students age, they may have increased nutrition knowledge, and this may influence them to have healthier eating habits.

When the eating habits of the grade 10, 11, and 12 participants were compared to each other, no significant differences were found. These results indicate that although there may be an improvement in eating habits after grade 9, the improvement does not continue further into later grades and may plateau. This result is not entirely surprising. There may be a reasonable limit in the improvement of eating that can be expected of adolescents. All adolescents may be influenced by friends and family, which may limit and impact their eating habits. In high school, peers have an impact on other students. Adolescence is a time marked by the influence of peers and conformity to group norms; this had been found to be especially true for adolescents 14-16 years of age (Steinburg, 1996). In order to have a sense of belonging, some students may be influenced by their peers or want to conform to the group standard when choosing foods (French et al., 1999; Neumark-Sztainer, Story, Perry, & Casey, 1999). Many of the interviewed participants spoke of the influence, both positive and negative, that their peers had on their own eating habits. Adolescents may also be influenced by their family (Story, Neumark-Sztainer, & French, 2002). If the adolescents do not prepare their own meals or complete their own grocery shopping, they are limited by availability and accessibility of food in their own homes. Several studies have found that the availability and accessibility of

precut vegetables or easy-to-eat fruits are positively related to fruit and vegetable consumption (Baranowski, Cullen, & Baranowski, 1999; Hearn et al., 1998).

Overall, all but 2 participants had average or low healthy eating habits. Although it was optimistic to think that more students would have high healthy eating habits, it is not unexpected that the majority do not. In addition to the influences of peers and family stated above, there are a number of other influences on an adolescent's food habits such as convenience, time constraints, and cost. Perceived time constraints and convenience were two reasons many of the interviewees gave for poor eating habits. Many of the participants indicated that their involvement in extracurricular activities or part-time jobs interfered with their eating proper meals. One participant spoke of preferring to sleep in rather than wake up in time for breakfast. Another participant spoke of eating in the school cafeteria because it was quicker than preparing a lunch from home. These reasons are similar to those found by Neumark-Sztainer et al. (1999).

Pressure and time constraints were also reasons given to Story and Resnick (1986) as to why adolescents do not have healthy eating behaviours. One participant spoke of a number of days she was so busy with extracurricular activities that she did not have time to eat or often forgot to eat. Another participant often spent the majority of her lunch hour completing schoolwork in the library, which does not permit the students to eat. If her teachers did not allow her to eat in class that day, she would go without lunch.

The cost of healthy food may also be preventing some students from having healthier eating habits. One participant spoke of the cost of healthy food in the cafeteria. She had only a limited amount of money to spend and found that she could buy more unhealthy food, which would leave her full, for the same amount of money as buying

healthy food, which would leave the participant still hungry. Even in the grocery store the cost of healthy food can be more expensive. One participant said that her mother did not always buy the fruits and vegetables that she requested because they were too expensive, especially when they are out of season. These explanations mimic results of previous studies. One study of adolescents' choices in vending machine snacks found that cost was the third most important reasoning for choice selection (taste and hunger were first and second respectively; French et al., 1999). A study of two high school cafeterias found that when the prices of fresh fruit and vegetables were reduced by 50%, there was a two-to-fourfold increase in the sale of these items (French, Story et al., 1997). Another study of 12 high schools found similar results; when the prices of low-fat vending machine snacks were reduced by 10, 25, or 50%, the sales of these snacks increased by 9, 39, and 93% correspondingly (French et al., 2001).

### *Body Image*

The body image of all the participants was collected through the body image questionnaire. The body image questionnaire asked questions to determine the participants' present thoughts and feelings towards their own bodies, which was used to gain an understanding as to whether or not the participant had a favourable or unfavourable body image. Body image was discussed with some participants through the interviews.

The results from the questionnaires showed no significant differences in the relationship between body image and those participants who have taken a course with nutrition curriculum compared to those who had no exposure to nutrition curriculum. This result is slightly unexpected. With the exception of biology, body image is a specific

expectation of the curriculum in the other two courses. Teachers of both classes require students to complete assignments and activities on the topic. So although the topic is covered in class, it does not have as much of an impact on the students.

Analysis of the questionnaires between those participants who had taken health and physical education beyond grade 9 were contrasted with all other participants and showed a significant difference between the two groups. Students enrolled in health and physical education engage in daily physical activity for each school day of the semester they are enrolled in the class. These results correspond to those of Marsh (1994) and Richman and Shaffer (2000), who found that females who play sports and engage in physical activity have a more favourable body image. The students who continue to enrol in health and physical education may also be more inclined to be involved in athletics outside of the school environment. This may also contribute to these particular students having a more favourable body image.

When examining the differences in relationships between participants who had enrolled in health and physical education beyond grade 9, those participants who took another course with nutrition curriculum, and all other participants, one explanation for the lack of relationship between body image and participants who took other courses with nutrition is that these participants may not feel as confident about their body or physical ability. Therefore these participants may shy away from health and physical education classes and take family studies or science instead. Additionally, unlike junior health and physical education classes, which tend to be same-sex classes, science and family studies courses tend to have both males and females in the class. The presence of males in the class may make the females in the class uncomfortable discussing body image and the

females may not take the topic as seriously. This may make the lessons and activities less effective and may have less of an impact on the students.

Examination of the participants' body image and school grade shows a significant difference between only grade 9 and grade 10 participants. This difference may be accounted for by the fact that grade 9 students may not feel as comfortable in the school and are a bit more self-conscious than the older students. Transitioning from a school where they were the oldest students to then becoming the youngest may be difficult for some grade 9s, and this may be reflected in their body image. Grade 9 students may compare themselves to the older students and may not feel adequate. As they progress through high school, they may become more confident in themselves.

The body image scores of all participants should be acknowledged. It is a very positive revelation that none of the participants had an unfavourable body image. Although it would be ideal for all participants to have a favourable body image it should be commended that all participants were at least neutral in their feelings towards their body image. However, this is not to say that all adolescent females within the school do not have an unfavourable body image. It must be acknowledge that students who may have an unfavourable body image may have shied away from participating in this type of study. Adolescence is a difficult time for young people, especially females, because of the physical changes their body undergoes and may impact their body image (Larson & Asmussen, 1991; Larson & Lampman-Petratis, 1989; Larson et al., 2002; Spear, 2002). It is therefore important that schools continually strive to improve the body image of female adolescent students. Adolescent females who have body dissatisfaction have been found to have poor nutrition and eating habits (Fabian & Thompson, 1989). Females who

are dissatisfied with their body may take steps to change their body through dieting or other weight loss techniques, which may impact their eating habits. A National Youth Risk Behaviour Survey found that adolescent girls who engage in extreme weight-loss behaviours such as diet pills or vomiting were less likely to consume fruits and vegetables than other less extreme dieters or nondieters (Story et al., 1998). Neumark-Sztainer, Story, Dixon, Resnick, and Blum (1997) found adolescents who frequently diet have an inadequate intake of dairy products. Skipping meals is another practice that some teens may employ in an effort to lose weight. In a national survey from the United States, 40% of students in grade 8 and grade 10 reported eating breakfast two or fewer days a week (Dausch et al., 1995). Another survey found that on the particular day that the survey was conducted, 24% of adolescent girls and 20% of adolescent boys did not eat breakfast (Lin, Guthrie, & Blaylock, 1996). This type of behaviour can lead to nutrient deficiencies. Nicklas, Myers, Reger, Beech, and Berenson (1998) found that adolescents who skipped breakfast had two to five times higher dietary inadequacy than those who had breakfast. Particularly, the participants who had skipped breakfast had lower daily mineral, vitamin, and energy intake compared to those who ate breakfast.

### *School Practices and Environment*

The interview provided an opportunity for the students to discuss their thoughts, feelings, and ideas about the curriculum, school environment, along with the school's nutrition practices and policies. All of the participants were excited at the chance of being interviewed and their voice being heard. Some participants who were not selected for an interview requested that they be granted an interview. This suggests that students want change and want to be heard.

The school environment can have a big impact on an adolescent's food habits. A national survey of schools in the United States found that 35 or 40% of a student's daily energy intake is consumed at school (Burghardt, Gordon, Chapman, Gleason, & Fraker, 1993). If students do not bring their lunch to school, they have the option to purchase something from one of the school's vending machines or the school cafeteria. All of the interviewed participants have purchased food from the vending machines or the cafeteria at some point since the beginning of the school year. Seventy-five percent of the interviewed participants eat in the cafeteria at least once a week. One major complaint of the participants was the temptation of the unhealthy foods present in the cafeteria. The smell of fried food, the sight of the candy and sweets is too much of a temptation for the students to resist. One participant felt that if there were only healthy options for the students to eat, they would still buy the food from the cafeteria or machine but would be forced to make healthier choices. From this change, the students may be exposed to healthier foods and find new healthier foods that they like and would not have tried before. This may have a domino effect, and the students may choose to make healthier choices outside of school.

Although there is some merit to the idea that a school should not be a superficial bubble for students and the school should mimic the real world, that means the food choices in school should be similar to the food choices that students will face outside of the school walls. This will assist the students in developing the skills and knowledge necessary to survive when faced with food choices outside of school.

If a school does not want to limit the students' options and choices, the school should give the students the tools required to make good nutrition choices. As of

December 2007, all prepackaged food in Canada are required to have nutrition labelling on their products (Health Canada, 2008). However, the homemade food and the food produced within the cafeteria is not required to provide a nutrition label for its consumers. One participant shared her idea of requiring the cafeteria to display the nutritional information of the food they produced so that the staff and students can make informed choices about what they are eating. This action would be in line with the third recommendation from Standing Committee on Health Report which suggests mandatory, standardized, and simple food labelling (Report of the Standing Committee on Health, 2007). Although students may still choose the unhealthier foods, the ones who may be swayed by the nutrition facts may make a healthier choice.

Besides the nutrition labels, the students would need the skills necessary to read the food labels. Students who enrol in grade 10 health and physical education or grade 10 food and nutrition are taught how to read food nutrition labels. Neither of these courses is mandatory. Students who do not take these courses must learn from another source, whether it is a parent, coach, or doctor. For adolescents, this type of skill is probably not a top priority. It would therefore be a good idea for this type of learning to be incorporated into a course which is mandatory for all students. Many of the participants felt that nutrition should be a component of a mandatory grade 9 class because most of the nutrition knowledge the participants had been taught in the elementary school was forgotten by the time the participants had reached high school.

When the cafeteria is closed, the only option students have to purchase food is from the vending machines. Vending machines have become very commonplace in today's schools. National data from the United States in 1995 found that 78% of high



schools contained some type of vending machine (Pateman et al., 1995). The school in which the research took place contained a total of three vending machines, a mixture of food and drinks. One participant was very adamant that there were very few healthy choices available for students to choose from. She was active in extracurricular activities after school and would sometimes forget an afternoon snack or may have eaten it earlier in the day. When she went to the vending machines she was usually disappointed to find no healthy food and would settle for a chocolate bar or some candy. Although the Ontario government passed legislation in 2004 which limited the types of acceptable healthy foods that were available in vending machines within Ontario elementary schools, there are currently no restrictions on the food allowed in high schools (Government of Ontario, 2004). Students are taken from an environment in elementary school, in which food choices are regulated and monitored, and resettled into an environment which has a huge array of high-sugar and high-fat food and drink choices (Story et al., 1996). Students are given little if any guidance as to how to make healthy food choices. For some schools, these vending machines provide a source of income for the school activities or athletics (Griffith, Sackin, & Bierbauer, 2000; Story & Neumark-Sztainer, 1999). In other schools, the contract for vending machines may be outsourced to companies for exclusive rights to the school (Griffith et al.). Therefore, schools may be hesitant to limit the food choices that are available for students because they may be afraid the students may not purchase the foods or provide a profit. However, a study on the proportion of sales of low-fat snacks found that when the prices of low-fat snacks were reduced, there was an increase in sales of these items by 25 to 45% (French, Jeffery, Story, Hannan, & Snyder, 1997). So although the vending machines may not make as much of a profit with healthy foods

as they do with unhealthy foods, a profit is still possible if the healthier foods are a reasonable price. Also, students would have healthier food choices available to them at all hours of the school day.

Although the participants who took nutrition education felt that the information they learned was helpful, there were some topics that they felt were not included and should be. One participant felt that it would be helpful to learn skills such as being able to make healthy choices from a restaurant menu. Almost one third of adolescents' take-out meals occur in fast food restaurants each year (Lin, Guthrie, & Frazao, 1999a; Lin et al., 1996). The average adolescent eats at a fast food restaurant two times per week (Channel One Network, 1998). This has a negative impact on the nutrition of the adolescent patron. Fast food restaurants' food is higher in total fat, saturated fat, and sodium. This food is also low in fibre, iron, and calcium (Lin, Guthrie, & Frazao, 1999b). It is unrealistic to think that adolescents will stop eating at fast food restaurants, but it would be beneficial for them to be taught how to make healthier choices at these restaurants.

Making the nutrition information meaningful and applicable to their everyday lives were more suggestions given by participants during the interviews. Many of the participants are involved in extracurricular activities or have part-time jobs. This sometimes prevents them from eating regular meals either on their own or with their family. A number of participants felt that it would be very advantageous for them to be shown and given practice making healthy snacks and meals they can make on their own. If students are shown that they are able to make nutritious food for themselves, they may be more reluctant to skip a meal or eat at a fast food restaurant.

Each culture has its own customs, traditions, and cooking methods surrounding food, which may differ from the traditional Canadian views. One participant felt that the information learned in class was difficult to apply to her cultural practices. Her family's meals and food selections were often very different from those discussed in class. Incorporating different cultures into the teaching of nutrition would embrace more students and allow them to relate to the material and hopefully apply it to their lives. The new Canada's Food Guide has incorporated foods from other cultures and should be used in the classroom to ensure inclusivity of all students.

Last, all of the participants felt that they did not have the skills required to analyze and interpret nutritional claims or articles. Food products often use nutritional claims to sell their products, and magazine articles may feature nutrition tips. All of the interviewed participants did not feel comfortable analyzing nutrition information and determining fact from fiction. These skills would fall under the realm of critical thinking. If teachers would incorporate these lessons into their teaching, students would be more prepared when faced with these claims or articles. This in turn may assist them in making healthier food choices.

### **Limitations**

In assisting students to learn and retain nutritional knowledge, teachers are helping to establish a foundation for healthy eating habits, which may in turn set the students up for a healthy lifestyle. It is important that the nutritional knowledge taught to students is clear, easy to understand, and fundamentally applicable to their lives.

There were a number of potential limitations with this study that could not be controlled by the researcher. The lifestyle and outside influences such as family, media,

and friends of the participants had an effect on the findings in this study (personal communication, Chunlei Liu, Feb. 18, 2009). Some of the participants were involved in competitive sports outside of the school system. Due to the competitive nature of these sports, some of the participants were given nutritional advice from coaches or dieticians. Also, some participants may have been required to make changes to their eating habits because of their training schedule or requests made by their coaches or dietician. This may have resulted in some participants gaining nutritional knowledge and developing better eating habits for reasons other than from their high school courses.

Another limitation that must be acknowledged is that although most teachers were willing to allow their students to miss class in order to participate in this study, some teachers would not allow the students to leave class. This meant that some students who may have wanted to participate in the study were denied the opportunity. Arrangements were made to allow the students to participate during their lunch or after school, but some students were reluctant to do so on their own time.

### **Delimitations**

This study has a number of delimitations that was imposed by the researcher, which restrict the ability to generalize the findings to all adolescent females. With respect to the study itself, one concern is the size and nature of the sample of participants in terms of the quantitative findings. The sample size of the study may not be representative of the population because it is small. The population from which the sample was drawn was small, which resulted in a smaller than desired sample size. The participants in this research were selected from a public school with middle to high socioeconomic status. The school's population is primarily Caucasian with some visible minorities. Also, the

school is known for strong academics. Only one school within the school board was used for the research for practicality reasons.

Another delimitation lies with the possible inaccuracies of self-reported data. The participants reported their own eating habits, body weight, and height, which for some individuals may be seen as a sensitive issue and thus intentionally misconstrued. The participants may have forgotten what they ate or chosen a response that they felt would put them in a better light by the researcher. Some participants chose not to answer some questions because they did not feel comfortable providing information such as their weight. Furthermore, certain behaviours such as eating fruits versus eating junk food may be over- or underreported (Brener, Billy, & Grady, 2003). However, in their review of the literature of the validity of self-reported data among adolescents for high-risk behaviour, Brener et al. found that adolescents provided more accurate and honest responses when they were assured that their responses would remain confidential. In order to encourage accurate and honest responses, participants were reassured of the confidential nature of the information that they provided. Participants were also assigned a research identification number so that their names would not be included on any of the documentation.

There are also a number of delimitations related to the process in which the study took place. Completion of each of the questionnaires occurred over the course of 1-2 weeks. Participants completed a new questionnaire only after the previous one had been completed by all participants. Most participants completed the questionnaire during class time, while others completed it during lunch. Furthermore, the interviews took place on an individual basis over the course of 2 weeks. Many of the participants may have been

friends with other participants, and, as a result, the participants may have discussed the questionnaire or interview after it had occurred. Despite the fact that participants were asked to refrain from discussing the process with other participants until after they had completed each individual component, there is no way to ensure that this happened. Such parameters may have caused bias of opinion in response to questions by some participants.

Although completion of each component of the study occurred during school hours, some students may have been reluctant to miss class time in order to complete the study's components. In addition, some teachers may not have been willing to allow students to miss class time to participate. All female students in the school were given the option to complete each component after school or during lunch, but some students may have been reluctant to use their own personal time to participate. This may have resulted in some students refraining from participating in the study.

During interviews, some participants gave brief or vague responses despite prodding by the researcher. These shorter responses may have reflected each participant's comfort level with the researcher. As a result, each participant's comfort level to share in-depth, personal thoughts and feelings may have limited the information given to the researcher.

The researcher was a teacher in the school and classroom teacher to some participants at the time of data collection. This may have resulted in some participants being more comfortable than others while speaking to the researcher. The responses of the participants may be reflective of each participant's comfort level with the researcher. Some participants gave brief or vague responses while other participants gave very

detailed and in-depth responses. The shorter responses may have reflected a participant's discomfort level with the researcher. As a result, each participant's comfort level to share in-depth, personal viewpoints may have affected the reliability of the findings.

Further, during the process of interviewing, deviation from the established interview protocol could have resulted in acquisition of data that were not applicable to the study purpose. However, it was important to ensure that each participant had the same opportunity to express her views so that data responses had a common ground for accurate coding, theme development, and analysis. Therefore, topics outside the protocol were discussed and explored. The comfort level of the participant and researcher may have resulted in the participant being more willing to open up about her thoughts, feelings, and ideas. This may have resulted in further deviation from the interview protocol.

During the collection of teaching documents, the researcher was provided with examples of handouts, assignments, tests, and textbooks from teachers of the courses, which contained nutrition curriculum, in which participants indicated they had been enrolled. However, these documents could not replace direct lesson observation and are not entirely reflective of the teaching and learning that occurred in the classroom. Day-to-day parameters and student attendance may have affected the relay of certain activities, ideas, or tests provided in the teaching documents and assumed to have been covered. Last, this study uses self-reported data to determine the participants' nutritional habits, body heights, and weights. This may mean that the information given by the participants may not be as accurate as other methods of collection. This may be because the

participants may alter their responses to be seen in a more positive light by the researcher or may not have an accurate and current read of such quantitative data.

Last, the researcher was a teacher within the school at the time of the study. This may have caused some teachers and students to feel pressure to participate in the study. Participants were told that their participation was voluntary and there would be no negative repercussions if they chose not to participate.

### **Implications**

The study has implications for the current curriculum, the school environment, classroom teachers, and the researcher. Certainly the evidence suggests that the current curriculum has some impact on the students, but there are still some improvements that could be made. The current school environment has a major impact on the students within it, and it is the students who would like it to be changed. For teachers, their impact on students is resounding and effective in different aspects. To the researcher, the study suggests that there are many more parameters to be explored in consideration of the current state of nutrition education and its impact on the students.

#### *Implications for Practice*

The findings in the present study suggest that improvements and changes could be made in the current nutrition knowledge, eating habits, and body image of adolescent females through education and the school environment. The study also suggests that the students are open to and want these changes. Although the results may not be significant in all areas of the quantitative data, the qualitative data suggest that the changes required are not always possible to measure.



The findings in the present study suggest that students do benefit from the current nutrition curriculum, although the amount of impact and change the current curriculum has on all aspects of nutrition may be limited and may differ from course to course. The teaching of nutrition in this school or any school is not static. Different approaches are used depending on the content being covered, the needs of the students, and the teachers delivering the material. Each subject has different curriculum and requirements which are set and cannot be altered. In some classes more emphasis may be placed on hands-on activities, while other classes may emphasize more pen and paper activities. Some classes may devote more time and effort to gaining the nutrition knowledge and less on the application of it. Since it is not plausible for a teacher to be able to select the curriculum that is to be taught in the classroom, creativity and flexibility are essential to ensure that the curricular expectations are covered appropriately while making nutrition fun and meaningful. Many of the students who had been exposed to nutrition curriculum were unable to take the information learned in the classroom and translate it into healthier eating habits. Students should be given ideas about how to apply the nutrition knowledge, because some students may have difficulty doing it on their own. Even small segments of information or activities about applying the nutrition information into everyday life may be beneficial to some students.

The school environment can play an important role in students' nutrition. The outcome of the study suggests that the students would like to see changes made to their current school environment. Many students are frustrated by the lack of support they receive to assist them in making healthy food choices. The cafeteria and vending machines contain too many tempting unhealthy choices and not enough appetizing

healthy ones. Posting nutrition information or providing students with more selection of healthy food choices provides students with more options and support. It also sends a message that the school is taking nutrition seriously and feels that is important to its students.

For the healthy food choices available in the cafeteria, many of the students found them to be expensive or not very appetizing. It would be of interest for the school to subsidize the cost of healthy food. Past studies have shown that when healthy food is less expensive, more people consume it (French, Jeffery, et al., 1997). The school could also ask students for input as to the healthy choices that are available for purchase in the school cafeteria or vending machines. This might make the students more accountable for their food choices because they had influence on the choices.

Collaboration between subject areas would ensure that nutrition information between all subject areas is not entirely repetitive and even supportive of each other. Information learned in one course could be further built upon in other courses. Furthermore, teachers should be given more support for resources. The Ontario Health and Educator Association provides sample activities to teachers to assist in the delivery of health material. These activities help make the courses more uniform among teachers of the same course section. It would be beneficial to supply sample activities to teachers of all subject areas to assist them in the delivery of the curriculum and even provide suggestions that the teachers may not have thought of otherwise.

### *Implications for Theory*

Social cognitive theory components have been effective in nutrition education programs (Corwin et al., 1999; Kirby et al., 1995; Parcel et al., 1995). With certain health

behaviours, especially ones that are considered appetitive or addictive behaviours, the consequences of the behaviour can reinforce or inhibit its occurrence (Bowen & Grunberg, 1987). Interviewed participants suggested that students might take nutrition education more seriously if they were aware of the impact poor nutrition has on their own health and the long-term effects.

When considering nutrition education, it is important that the effects of the environment are not forgotten. Many students may look to the people in their environment for cues about nutrition (Perry, et al., 1993). The information collected during the interviews suggests that peers and family play significant roles in shaping the nutrition knowledge and eating habits of the participants. It is therefore important that the impact of peers and family is not forgotten when teaching students nutrition. It would be naïve for teachers to think that the information they teach in the classroom is in isolation. Any information the students learn could potentially be reversed by the impact of their family or peers. Mandatory nutrition education for all students would help educate all of the students and may limit the impact of peers because everyone would be aware of the impact of nutrition. Informing parents about nutrition would also be essential to having more impact on the students' nutrition. Parents themselves may have limited nutrition knowledge and may be unintentionally sabotaging their child's nutrition as well as the information learned in school. Providing nutrition seminars to parents would assist in educating them and provide a more thorough approach to teaching adolescents nutrition. This type of solution may assist in the lessons taught in the classroom being reinforced in the home.

Further to this point, the social cognitive theory suggests that the environment plays an important role in the changing of a person's behaviour (Glanz, Rimer, & Lewis, 2002). Teachers within the classroom may be portraying messages about healthy nutrition but if the school environment is contradicting these messages, changes in behaviour may be impacted. Many of the interviewed participants were frustrated by the lack of healthy food choices available to them. They spoke of learning about different unhealthy foods, such as French fries, potato chips, and candy, yet these foods comprise the main source of food for purchase. The students found it very difficult to change their eating habits when they were faced with the temptation of unhealthy foods. It is important that schools reinforce the messages taught in the classroom by providing healthy foods for the students. A supportive environment will assist the students in changing their behaviours.

Observational learning may play a part in the students' retention of nutrition information (Glanz et al., 2002). Observing the actions and words spoken by teachers may consciously or unconsciously impact a student. It is therefore important that teachers are aware of the impact of their actions inside and outside the classroom. It is therefore important that teachers who do teach nutrition model the behaviours that they are trying to teach because it will have more of an impact on the students' learning. A teacher who teaches nutrition and is always seen by his or her students eating French fries may impact whether or not the students take the teacher, as well as nutrition, seriously.

#### *Implications for Further Research*

The researcher had initially hoped that the results of this work would provide some answers to the nutrition knowledge, eating habits, and body image of adolescent females. The information could be extrapolated to suggest whether the current high

school nutrition curriculum is effective. To a small degree the research did this, but it also highlighted just how many more questions remain to be answered before a clear understanding of the effectiveness of the current nutrition curriculum can emerge.

The first consideration for further research would be to determine the longevity of any improvements in nutrition knowledge, eating habits, and body image, by performing pretests on the students at the beginning of the course and completing posttests at the end of the course and then again one year later or at the end of the high school career. Some differences existed between the different grade levels, but it is not known if the students, beyond the length of the course or school year, retain the improvements in nutrition knowledge, eating habits, and body image. It would be interesting to look at how long the nutrition education impacts the students and to see if any differences exist by the end of the students' high school career. Perhaps the understanding of nutrition may become more or less evident after a period of time has passed. Perhaps it is not only the quantity of the understanding that needs to be measured but also the depth and longevity.

Parental attitude, opinion, and support were not considered in this research and could have provided some interesting perspectives with respect to the results. It would be beneficial to know how much each participant's parents support the nutrition of their child. It would be interesting to discover if any information the students learned in class was taken home, discussed with the parents, and has encouraged change in the eating habits or food purchasing at the family level. In addition, some insight into the parents' influence would assist in understanding whether or not changes in a student's eating habits are plausible. If parents do not support a student's effort to change their eating habits, the changes a student can make may be small or difficult. All of the interviewed

participants spoke of their parents making the majority of their meals and doing the grocery shopping. If the parents were not supportive of the changes, such as not altering their current meal preparation or grocery shopping purchases, students may be limited on the possible changes and may not embrace any changes in the long time.

Since many teachers taught the courses involving nutrition curriculum and even those within the subject areas, it is possible there was some variation between the different sections. It would have been beneficial to determine if there were any differences within course sections. Some teachers may have put more of a focus on different areas of nutrition for various reasons, such as their own personal knowledge or experience. This may have influenced the knowledge and skills learned as well as the impact that the lessons had on the students.

Self-efficacy is a component to the social cognitive theory and can impact whether or not a person will put forth the effort required to change his or her behaviour (Bandura, 1994). The self-efficacy of the students was not measured but may provide some insight as to the lack of impact the nutrition education has on a student's eating habits. Students may not feel as though they have the knowledge or skills necessary to make changes to their eating habits.

If a student recognizes a teacher as a role model, they are more likely to have an impact on the student's learning (Chiou & Yang, 2006). This study did not directly measure the impact the classroom teacher had on the participants above the delivery of the subject matter and the teaching material used. It would be of interest to measure the impact of the teachers inside and outside of the classroom. Teachers' actions outside the classroom, such as what they purchase at the cafeteria or give students as rewards, may

impact the students' thoughts and feelings towards nutrition. Some teachers within a school may be seen as more of a role model for some students and therefore may have varying impacts on students depending on the teacher.

### **Conclusion**

With the increasing concern for adolescent health because of the nutrient and diet-related risks that are highly prevalent among adolescents, there is a growing need for nutrition education within high schools (Canadian School Health Centre, n.d.). In the present Canadian culture there is a growing reliance on snack foods and an increasing number of adolescents with nutrient deficiencies in some vitamins and minerals (Garriguet, 2004).

The current Ontario school system does not fully support and encourage adolescents to make changes in their nutrition. The lack of mandatory nutrition education in high schools ensures that some students do not receive any nutrition education after elementary school. Many of the participants did not remember anything about the nutrition education they learned in elementary school. Without a reminder and refresher of this information, students in high school are not always aware of the impact nutrition has on their lives and what they can do about it. Further, in high school, students are starting to have more autonomy over their nutrition and therefore need guidance and assistance in developing healthy eating habits.

The focus of this research was primarily about understanding the current state of adolescent females' nutrition knowledge, eating habits, body image, and the effectiveness of the current curriculum and school environment in improving these. Although the research did not provide any absolute answers about the effectiveness of the current

curriculum, it did provide some tantalizing glimpses at the effectiveness of some areas as well as improvements in others. Although the relationships and measures of success were not as dramatic and numerous, there were nonetheless signs that the current curriculum does have some positive impacts on students.

The food sold in the cafeteria and vending machines sends contradictory messages to what is received in the classroom. This may be having an impact on the students' ability to apply their nutrition knowledge and change their eating habits. Schools should be aware of these impacts and strive to support the students outside the classroom.

The research provides an impetus for further changes to the delivery of nutrition education and the current school environment. If the current curriculum does not encourage the improvement of body image and food habits, then perhaps changes to the curriculum should be made to encourage more improvement in these areas. If there are more specific expectations for application of skills of nutrition knowledge and more emphasis on practical applications, there may be more translation of the nutrition knowledge into healthier eating habits. More specific expectations could also be created for assisting female students in further developing a healthy body image. More specific expectations would also act as a guideline for teachers in the delivery of the curriculum within the classroom.

Nutrition education holds enormous potential in improving the health of adolescents. Current Canadian society is at a turning point in which the health of adolescents is at a pivotal point. Nutrition plays an important part in establishing a healthy lifestyle. Changes to the current nutrition curriculum and school environment



could provide students with the knowledge and skills needed to develop a healthy lifestyle. These changes could provide momentum towards a complete turnaround of the present health of adolescents. Nutrition education is based on the information taught not only within the classroom walls but also the school as a whole. The fact this research suggests that the students are open and willing to these changes and want to know more about nutrition is a step in the right direction. Further research is needed to understand more about the other impacts aspects within the curriculum and school environment have on a student's nutrition. The long-term resounding impact of effectively increasing students' nutrition knowledge, implanting changes in their eating habits, and developing a more favourable body image will most certainly make it worth the effort.

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**Appendix A**  
**Student Profile Sheet**

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

Please complete the questions below so I have an understanding of the school courses in which you were taught nutrition.

1. Did you enrol in health and physical education in grade 10?

- a) yes            Y  
b) no            Y
- 

2. Have you taken a family studies course in which nutrition was taught and discussed?

- a) yes            Y  
b) no            Y
- 

2b. If yes, please state the course which you took.

\_\_\_\_\_

---

3. Have you taken a science course in which nutrition was taught and discussed?

- a) yes            Y  
b) no            Y
- 

3. If yes, please state the course which you took.

\_\_\_\_\_

---

4. Please state any other courses in which nutrition was taught and discussed.

\_\_\_\_\_

## Appendix B

### Nutrition Knowledge Questionnaire<sup>1</sup>

Student Number: \_\_\_\_\_

This is a questionnaire and not a test. Your answers will help identify the level of dietary knowledge you have.

1. It is important that you complete the questionnaire by yourself.
2. Your answers will remain confidential.
3. If you do not know the answer, mark 'not sure' rather than guess.
4. If you have any questions don't hesitate to ask the researcher.

**The first few items are about what advice you think experts are giving us.**

---

1) Do you think health experts recommend that people should be eating more, the same amount or less of these foods.

|                         | More                     | Same                     | Less                     | Not Sure                 |
|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Vegetables              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sugary foods            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Meats                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| High fat foods          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| High carbohydrate foods | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| High fibre foods        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Salty foods             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fruits                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

2) How many servings of fruits and vegetables do you think experts advise people to eat? (One serving would be an apple or handful of carrots)

---

3) What fat do experts say is most important for people to cut down on? (*tick one*)

- |                    |                          |
|--------------------|--------------------------|
| a) unsaturated fat | <input type="checkbox"/> |
| b) trans fat       | <input type="checkbox"/> |
| c) saturated fat   | <input type="checkbox"/> |
| d) not sure        | <input type="checkbox"/> |
- 

---

<sup>1</sup> From "Development of a general nutrition knowledge questionnaire for adults," by K. Parmenter and J. Wardle, 1999. *European Journal of Clinical Nutrition*, 53, p. 302. Copyright 1999 by Stockton Press. Adapted with permission.

4) What versions of dairy foods do experts say people should eat? (*tick one*)

- a) full fat ☐
- b) lower fat ☐
- c) mixture of full fat and lower fat ☐
- d) neither, dairy should be cut out ☐
- e) not sure ☐

**Experts classify foods into groups. This section is used to determine whether or not adolescents are aware of what foods are in these groups**

---

5) Do you think these foods are high or low in added sugar? (*tick one box per food*)

|                             | High                     | Low                      | Not Sure                 |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| Bananas                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Tomato ketchup              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ice cream                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fruit cups in natural juice | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Red apples                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Unflavoured yogurt          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

6) Do you think these foods are high or low in fat? (*tick one box per food*)

|                       | High                     | Low                      | Not Sure                 |
|-----------------------|--------------------------|--------------------------|--------------------------|
| Pasta (without sauce) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Baked beans           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sandwich meat         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Honey                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eggs                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cheddar cheese        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Butter                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Regular cream cheese  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Nuts                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

7) Do you think experts classify these foods in the carbohydrate group? *(tick one box per food)*

|         | Yes                      | No                       | Not Sure                 |
|---------|--------------------------|--------------------------|--------------------------|
| Cheese  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pasta   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Butter  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Nuts    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Rice    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Oatmeal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Bread   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

8) Do you think these are high or low in salt? *(tick one box per food)*

|                    | High                     | Low                      | Not Sure                 |
|--------------------|--------------------------|--------------------------|--------------------------|
| Pasta (with sauce) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Red meat           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Frozen vegetables  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cheese             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Carrots            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sandwich meat      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

9) Do you think these foods are high or low in protein? *(tick one box per food)*

|             | High                     | Low                      | Not Sure                 |
|-------------|--------------------------|--------------------------|--------------------------|
| Chicken     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cheese      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fruit       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Baked beans | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Butter      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Milk        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

10) Do you think these foods are high or low in fibre? *(tick one box per food)*

|                           | High                     | Low                      | Not Sure                 |
|---------------------------|--------------------------|--------------------------|--------------------------|
| Cornflakes cereal         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Bananas                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eggs                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Baked beans               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Nuts                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fish                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Broccoli                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Chicken                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Baked potatoes with skins | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

11) Do you think these fatty foods are high or low in saturated fat? *(tick one box per food)*

|               | High                     | Low                      | Not Sure                 |
|---------------|--------------------------|--------------------------|--------------------------|
| Salmon        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Whole milk    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Olive oil     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Red meat      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sunflower oil | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Chocolate     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Red peppers   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

12) Some foods contain a lot of fat but no cholesterol.

- a) agree ☐  
 b) disagree ☐  
 c) not sure ☐

13) Do you think experts would call these a healthy alternative to red meat? *(tick one box per food)*

|                | High                     | Low                      | Not Sure                 |
|----------------|--------------------------|--------------------------|--------------------------|
| Nuts           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Low fat cheese | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Turkey         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sandwich meat  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Quiche         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Fish           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

14) A glass of unsweetened fruit juice counts as a serving of fruit.

- a) agree ☐
  - b) disagree ☐
  - c) not sure ☐
- 

15) Saturated fats are mainly found in: (*tick one*)

- a) vegetable oils ☐
  - b) dairy products ☐
  - c) both (a) and (b) ☐
  - d) not sure ☐
- 

16) Brown sugar is a healthy alternative to white sugar.

- a) agree ☐
  - b) disagree ☐
  - c) not sure ☐
- 

17) There is more protein in a glass of whole milk than in a glass of skimmed milk.

- a) agree ☐
  - b) disagree ☐
  - c) not sure ☐
- 

18) Polyunsaturated margarine contains less fat than butter.

- a) agree ☐
  - b) disagree ☐
  - c) not sure ☐
- 

19) Which of these breads contain the most vitamins and minerals (*tick one*)

- a) white ☐
  - b) whole wheat ☐
  - c) multigrain ☐
  - d) not sure ☐
-

20) What do you think is higher in calories: butter or regular margarine? (*tick one*)

- a) butter ☐
  - b) regular margarine ☐
  - c) both the same ☐
  - d) not sure ☐
- 

21) A type of oil which contains mostly unsaturated fat is: (*tick one*)

- a) coconut oil ☐
  - b) sunflower oil ☐
  - c) olive oil ☐
  - d) palm oil ☐
  - e) not sure ☐
- 

22) There is more calcium in a glass of whole milk than a glass of skimmed milk.

- a) agree ☐
  - b) disagree ☐
  - c) not sure ☐
- 

23) Which one of the following has the most calories for the same amount of weight? (*tick one*)

- a) carbohydrates ☐
  - b) fat ☐
  - c) protein ☐
  - d) not sure ☐
- 

24) Fats that are solid at room temperature (*tick one*)

- a) monounsaturated ☐
  - b) polyunsaturated ☐
  - c) saturated ☐
  - d) not sure ☐
- 

25) Polyunsaturated fats are mainly found in: (*tick one*)

- a) vegetable oils ☐
  - b) dairy products ☐
  - c) both (a) and (b) ☐
  - d) not sure ☐
-

**The next few questions are about choosing foods. Please answer what is being asked and not whether you like or dislike the food.**

For **example**, suppose you were asked...

'If a person wanted to cut down on fat, which cheese would be best to eat?'

- a) cheddar cheese
- b) cream cheese
- c) cottage cheese
- d) marble cheese

If you didn't *like* cottage cheese but knew it was the right answer you would still tick cottage cheese.

---

26) Which would be the best choice for a low fat, high fibre snack? (*tick one*)

- a) low fat yogurt ☐
  - b) raisins ☐
  - c) cereal bar ☐
  - d) whole wheat crackers and cheddar cheese ☐
- 

27) Which would be the best choice for a low fat, high fibre light meal? (*tick one*)

- a) grilled chicken ☐
  - b) cheese on whole wheat toast ☐
  - c) beans on whole wheat toast ☐
  - d) cheese omelette ☐
- 

28) If people wanted to reduce the amount of fat in their diet, which would be the best choice? (*tick one*)

- a) steak, grilled ☐
  - b) sausages, grilled ☐
  - c) turkey, grilled ☐
  - d) pork chop, grilled ☐
- 

29) If people feel like something sweet, but are trying to cut down on sugar, which would be the best choice? (*tick one*)

- a) honey on toast ☐
  - b) a cereal snack bar ☐
  - c) low fat cookies ☐
  - d) banana with plain yogurt ☐
- 

30) If people want to reduce the amount of salt in their diet, which would be the best choice? (*tick one*)

- a) store bought lasagne ☐
  - b) mushroom omelette ☐
  - c) stir fry vegetables with soy sauce ☐
  - d) ham with pineapple ☐
-



Experts often use food labels to determine the nutritional content of some foods. The following section asks you about Nutrition Facts food labels.

Here is an example of a Nutrition Facts food label:

| Nutrition Facts                      |               |
|--------------------------------------|---------------|
| Per 1/2 cup (125 mL)                 |               |
| Amount                               | % Daily Value |
| Calories 70                          |               |
| Fat 0.5 g                            | 1 %           |
| Saturated Fat 0 g<br>+ Trans Fat 0 g | 0 %           |
| Cholesterol 0 mg                     |               |
| Sodium 250 mg                        | 10 %          |
| Carbohydrate 13 g                    | 4 %           |
| Fibre 2 g                            | 8 %           |
| Sugars 6 g                           |               |
| Protein 2 g                          |               |
| Vitamin A 1 %                        | Vitamin C 2 % |
| Calcium 0 %                          | Iron 4 %      |

31) The % Daily Value tells the consumer what percent of their daily intake of each nutrient is in one serving of the food.

- a) true ☐
- b) false ☐
- c) not sure ☐

32) If a person were to eat 1 cup of the above food, they would be consuming 500 mg of sodium.

- a) true ☐
- b) false ☐
- c) not sure ☐

33) The above food is a 'good source' of iron.

- a) true ☐
- b) false ☐
- c) not sure ☐

**'Brand A'**

| Nutrition Facts                      |     |               |     |
|--------------------------------------|-----|---------------|-----|
| Per 2 cookies (30 g)                 |     |               |     |
| Amount                               |     | % Daily Value |     |
| Calories 150                         |     |               |     |
| Fat 7 g                              |     | 11 %          |     |
| Saturated Fat 3 g<br>+ Trans Fat 1 g |     | 20 %          |     |
| Cholesterol 0 mg                     |     |               |     |
| Sodium 80 mg                         |     | 3 %           |     |
| Carbohydrate 21 g                    |     | 7 %           |     |
| Fibre 1 g                            |     | 4 %           |     |
| Sugars 8 g                           |     |               |     |
| Protein 1 g                          |     |               |     |
| Vitamin A                            | 0 % | Vitamin C     | 0 % |
| Calcium                              | 0 % | Iron          | 8 % |

**'Brand B'**

| Nutrition Facts                      |     |               |     |
|--------------------------------------|-----|---------------|-----|
| Per 4 cookies (30 g)                 |     |               |     |
| Amount                               |     | % Daily Value |     |
| Calories 130                         |     |               |     |
| Fat 4 g                              |     | 6 %           |     |
| Saturated Fat 1 g<br>+ Trans Fat 1 g |     | 10 %          |     |
| Cholesterol 0 mg                     |     |               |     |
| Sodium 80 mg                         |     | 3 %           |     |
| Carbohydrate 23 g                    |     | 7 %           |     |
| Fibre 0 g                            |     | 0 %           |     |
| Sugars 6 g                           |     |               |     |
| Protein 2 g                          |     |               |     |
| Vitamin A                            | 0 % | Vitamin C     | 0 % |
| Calcium                              | 0 % | Iron          | 8 % |

34) The cookies with the lowest amount of fat is:

- a) Brand A ☐
- b) Brand B ☐
- c) not sure ☐

35) Brand B has more calories per each individual cookie

- a) true ☐
- b) false ☐
- c) not sure ☐

36) The amount of calories, fat, protein, carbohydrate, and sodium must be listed on Canadian food labels.

- a) true ☐
- b) false ☐
- c) not sure ☐

37) For a food to claim that it is 'low in fat' it must have less than 3 grams of fat.

- a) true ☐
- b) false ☐
- c) not sure ☐

38) For a food to claim it is 'reduced in calories' it must have at least 25% less calories than the food it is being compared to.

- a) true ☐
  - b) false ☐
  - c) not sure ☐
- 

**This section is about health problems or diseases.**

39) Are you aware of major health problems or diseases that are related to a *low intake of fruit and vegetables*?

- a) yes ☐
- b) no ☐
- c) not sure ☐

If yes, what diseases or health problems do you think are related to a low intake of fruit and vegetables?

---

---

40) Are you aware of any major health problems or diseases that are related to a *low intake of fibre*?

- a) yes ☐
- b) no ☐
- c) not sure ☐

If yes, what diseases or health problems do you think are related to low fibre intake?

---

---

41) Are you aware of any major health problems or diseases that are related to *how much sugar* people eat?

- a) yes ☐
- b) no ☐
- c) not sure ☐

If yes, what diseases or health problems do you think are related to sugar?

---

42) Are you aware of any major health problems or diseases that are related to *how much salt or sodium* people eat?

- a) yes ☐  
 b) no ☐  
 c) not sure ☐

If yes, what diseases or health problems do you think are related to salt?

---

43) Are you aware of any major health problems or diseases that are related to *the amount of fat* people eat?

- a) yes ☐  
 b) no ☐  
 c) not sure ☐

If yes, what diseases or health problems do you think are related to fat?

44) Do you think these help to reduce the chances of getting certain kinds of cancer?  
 (answer each one)

|                                  | High                     | Low                      | Not Sure                 |
|----------------------------------|--------------------------|--------------------------|--------------------------|
| Eating more fibre                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less sugar                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less fruit                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less salt                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating more fruit                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating more vegetables           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less artificial additives | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

45) Do you think these help prevent heart disease? (answer each one)

|                                  | High                     | Low                      | Not Sure                 |
|----------------------------------|--------------------------|--------------------------|--------------------------|
| Eating more fibre                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less saturated fat        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less salt                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating more fruit                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating more vegetables           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Eating less artificial additives | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

46) Which one of these is more likely to raise people's blood cholesterol level? (*tick one*)

- a) antioxidants ☐
  - b) polyunsaturated fats ☐
  - c) saturated fats ☐
  - d) cholesterol in the diet ☐
  - e) not sure ☐
- 

47) Are vitamins antioxidants (substances that may protect your cells against the effects of cell damage)?

- a) yes ☐
  - b) no ☐
  - c) not sure ☐
- 

48) Are minerals antioxidants (substances that may protect your cells against the effects of cell damage)?

- a) yes ☐
  - b) no ☐
  - c) not sure ☐
- 

49) What are the functions of vitamins and minerals?

- a) to help build muscles ☐
  - b) to help lose body fat ☐
  - c) to help reactions in the body take place ☐
  - d) to provide energy ☐
  - e) I don't know ☐
- 

50) Which of the following are vitamins and which are minerals?

|           | Vitamins                 | Minerals                 | Not Sure                 |
|-----------|--------------------------|--------------------------|--------------------------|
| Vitamin A | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Zinc      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vitamin C | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Iron      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Calcium   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## Appendix C

### Nutrition Habits Questionnaire<sup>2</sup>

Student Number: \_\_\_\_\_

This is a questionnaire and not a test. Your answers will help identify your dietary habits you have.

1. It is important that you complete the questionnaire by yourself.
2. Your answers will remain confidential.
3. Answer the questions which best reflect your dietary habits.
4. If you have any questions don't hesitate to ask the researcher.

This section is to determine your food frequency consumption. Some questions have multiple parts. Please read the questions carefully and only answer those that apply to you.

1a) Do you drink milk and/or eat yogurt every day?

- a) yes ☐
- b) no ☐

1b) If yes, how many glasses/cups of milk and/or yogurt do you consume every day?

- a) 1-2 ☐
- b) 3-4 ☐
- c) more than 4 ☐

1c) If no, how many times do you consume milk and/or yogurt during 1 week?

- a) 0 ☐
- b) 1-2 ☐
- c) 3-4 ☐
- d) more than 4 ☐

1d) The milk and/or yogurt I consume is mostly:

- a) fat-free/skim ☐
- b) low-fat/1% ☐
- c) regular/2% ☐
- d) whole milk ☐
- 

---

<sup>2</sup> From "Reliability of a dietary questionnaire on food habits, eating behaviour and nutritional knowledge of adolescents," by G. Turconi, M. Celsa, C. Rezzani, G. Biino, M. A. Sartirana and C. Roggi, 2003. *European Journal of Clinical Nutrition*, 57, p. 758. Copyright 2003 by Nature Publishing Group. Adapted with permission.

2a) Do you eat pasta, rice and/or bread every day?

- a) yes ☐
- b) no ☐

2b) If yes, how many portions (1 cup cooked) of pasta, rice and/or bread do you eat every day?

- a) 1-2 ☐
- b) 3-4 ☐
- c) more than 4 ☐

2c) If no, how many times do you eat portions (1 cup cooked) of pasta, rice and/or bread do you eat during 1 week?

- a) 0 ☐
- b) 1-2 ☐
- c) 3-4 ☐
- d) more than 4 ☐

2d) The pasta, rice and/or bread you eat is:

- a) always whole wheat ☐
  - b) usually whole wheat ☐
  - c) sometimes whole wheat ☐
  - d) never whole wheat ☐
- 

3a) Do you eat fruits and vegetables every day?

- a) yes ☐
- b) no ☐

3b) If yes, how many portions (1 cup or medium size fruit/vegetable) of fruit and portions of vegetables do you eat every day?

- a) 1-2 ☐
- b) 3-4 ☐
- c) more than 4 ☐

3c) If no, how many portions (1 cup or medium size fruit/vegetable) of fruit and vegetables do you eat during 1 week?

- a) 0 ☐
- b) 1-2 ☐
- c) 3-4 ☐
- d) more than 4 ☐

3d) The fruits and vegetables I eat are:

- a) mostly fresh ☐
  - b) mostly from cans ☐
  - c) mostly from frozen ☐
  - d) combination of the above ☐
- 

4a) Do you eat red meat every day?

- a) yes ☐
- b) no ☐

4b) If yes, how many portions (the size of a deck of cards) of red meat do you eat every day?

- a) 1-2 ☐
- b) 3-4 ☐
- c) more than 4 ☐

4c) If no, how many portions (the size of a deck of cards) of red meat do you eat during 1 week?

- a) 0 ☐
- b) 1-2 ☐
- c) 3-4 ☐
- d) more than 4 ☐

4d) The red meat I eat is:

- a) usually extra lean cuts ☐
  - b) usually lean cuts ☐
  - c) usually regular cuts ☐
  - d) I do not eat red meat ☐
- 

5) How many times do you eat fish in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

6) How many times do you eat cheese in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
-



7) How many times do you eat chicken or turkey in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

8) How many times do you eat beans or legumes in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

9) How many times do you eat cakes and cookies in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

10) How many times do you eat French fries in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

11) How many times do you eat fast food in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
-

12) How many times do you eat pizza in 1 week?

- a) 1-2 ☐
  - b) 3-4 ☐
  - c) more than 4 ☐
  - d) 1 time in 10-15 days ☐
  - e) never ☐
- 

This section is to determine your food habits. Some questions have multiple parts. Pick the answer which best suits your habits.

13a) Do you eat breakfast?

- a) always ☐
- b) often ☐
- c) sometimes ☐
- d) never ☐

13b) Which beverage do you consume at breakfast?

- a) milk ☐
- b) fruit juice ☐
- c) coffee/tea ☐
- d) nothing ☐

13c) What do you eat for breakfast? *(Check all that apply)*

- a) cold cereal ☐
  - b) oatmeal ☐
  - c) fruit ☐
  - d) toast/muffin/bagel ☐
  - e) eggs ☐
  - f) other: \_\_\_\_\_
- 

14) Do you eat at least 2 portions (1 cup or medium size fruit) of fruit every day?

- a) always ☐
  - b) often ☐
  - c) sometimes ☐
  - d) never ☐
- 

15) Do you eat at least 2 portions (1 cup or medium size vegetable) of vegetables every day?

- a) always ☐
  - b) often ☐
  - c) sometimes ☐
  - d) never ☐
-

16) Do you usually eat dessert after every meal?

- a) always ☐
  - b) often ☐
  - c) sometimes ☐
  - d) never ☐
- 

17) Do you usually eat breakfast, lunch and dinner every day?

- a) always ☐
  - b) often ☐
  - c) sometimes ☐
  - d) never ☐
- 

18) Your diet is:

- a) different every day ☐
  - b) different only sometimes during the week ☐
  - c) different only during the weekend days ☐
  - d) usually the same ☐
- 

19) What percentage of your daily calories are from carbohydrates (i.e., bread, fruit, vegetables, etc)?

- a) 0-20 ☐
  - b) 21-39 ☐
  - c) 40-60 ☐
  - d) 60+ ☐
- 

20) What percentage of your daily calories are from protein (i.e. meat, nuts, dairy products, etc.) ?

- a) 0-10 ☐
- b) 11-19 ☐
- c) 20-30 ☐
- d) 30+ ☐

21) What percentage of your daily calories are from fat (i.e., butter, oils, within meat or dairy products)?

- a) 0-10 ☐
  - b) 11-19 ☐
  - c) 20-30 ☐
  - d) 30+ ☐
- 

22) Your snacks are based mainly on:

- a) fruit and vegetables ☐
  - b) crackers, bread, cookies ☐
  - c) French fries, chips ☐
  - d) candy, chocolate bars ☐
- 

23) Which beverage do you usually drink between meals?

- a) water ☐
  - b) soft drinks (i.e., cola, ice tea etc.) ☐
  - c) fruit juice ☐
  - d) sports drinks ☐
  - e) milk ☐
- 

24) How many glasses of water do you drink each day?

- a) 0-2 ☐
  - b) 3-4 ☐
  - c) 5-6 ☐
  - d) 7-8 ☐
  - e) 8+ ☐
- 

**This section is to determine your knowledge of healthy and unhealthy nutrition habits.**

25) According to you, which is a healthy diet?

- a) a diet rich in different foods ☐
  - b) food rich in protein (meat, fish, eggs, cheese) ☐
  - c) a diet without any fats ☐
  - d) eating fish very often ☐
- 

26) According to you, which is the healthiest eating behaviour?

- a) drinking two glasses of milk or eating two cups of yogurt each day ☐
  - b) preferring cooked vegetables to uncooked vegetables ☐
  - c) eating always cheese instead of meat ☐
  - d) when you choose fruit instead of crackers as a snack ☐
-

27) According to you, which is a healthy food?

- a) a food rich in protein ☐
  - b) a food rich in calories ☐
  - c) a genetically modified food ☐
  - d) a food organically grown ☐
- 

28) According to you, which is the healthiest food?

- a) washed vegetables ready to eat ☐
  - b) a canned food ☐
  - c) a food with lots of sauce on it ☐
  - d) a fried food ☐
- 

29) According to you, which is the healthiest cooking method?

- a) cooking on a grill ☐
  - b) frying ☐
  - c) baking it in the oven ☐
  - d) cooking in a pan with fat ☐
- 

30) According to you, the foods you eat should:

- a) be high in the amount of protein ☐
- b) be limited in the amount of carbohydrates ☐
- c) be low in fat ☐
- d) be a balance of all different types of food ☐

## Appendix D

### Body Image Questionnaire<sup>3</sup>

Research Id: \_\_\_\_\_

This is a questionnaire and not a test. Your answers will help identify your current body image.

1. It is important that you complete the questionnaire by yourself.
2. Your answers will remain confidential. If you are comfortable, please answer the following questions (all information will be kept confidential and only the researcher will see it).
3. For each question, please circle 'A' if you agree with the statement, 'D' if you disagree with the statement and 'U', if you are undecided.

|  | Agree (A) | Disagree (D) | Undecided (U) |
|--|-----------|--------------|---------------|
| 1. My weight is appropriate for my height.   | A         | D            | U             |
| 2. I'm too heavy.  | A         | D            | U             |
| 3. I feel good about my body image.  | A         | D            | U             |
| 4. I wish I were taller.   | A         | D            | U             |
| 5. I'm satisfied with my present weight.   | A         | D            | U             |
| 6. I think my thighs are too fat.  | A         | D            | U             |
| 7. When I look into a full-length mirror, I'm satisfied with what I see.           | A         | D            | U             |
| 8. I have too much fat around my waist.  | A         | D            | U             |
| 9. I'm confident that when other people look at me, they are favourably impressed. | A         | D            | U             |
| 10. I would be happier with my body image if I could redistribute my body fat.     | A         | D            | U             |
| 11. Participation in sports has provided me with a favourable body image.          | A         | D            | U             |
| 12. I wish I could lose some weight.   | A         | D            | U             |
| 13. I watch my diet carefully.   | A         | D            | U             |
| 14. I wish I were more muscular.   | A         | D            | U             |
| 15. Exercising has given me a good body.   | A         | D            | U             |
| 16. A favourable body image is NOT important.                                      | A         | D            | U             |
| 17. A favourable body image is very important.                                     | A         | D            | U             |
| 18. Being overweight has nothing to do with being successful                       | A         | D            | U             |
| 19. Athletes have better-looking bodies than non-athletes                          | A         | D            | U             |
| 20. You are born with a basic body type that can be changed very little            | A         | D            | U             |

<sup>3</sup> From "Relationship between body image and percent body fat among college male varsity athletes and nonathletes," by D. C. Huddy, D.C. Nieman and R.L. Johnson, 1993. *Perceptual and Motor Skills*, 77, p. 1078. Copyright 1993 by Elsevier. Adapted with permission.

21) Self reported weight: \_\_\_\_\_

22) Self reported height: \_\_\_\_\_

## Appendix E

### Interview Questions

This section will focus on the student's nutrition knowledge

1. Where have you learned about nutrition?
  - 1b. Of these sources, which do you feel has had the strongest impact on your nutrition knowledge?
2. Are you interested in nutrition?
  - 2b. Have you ever looked at nutrition information on the internet or a book because you were interested in it?
3. Have you taken a school course in which nutrition was discussed?
  - 3b. If so, did you enjoy the course?
  - 3c. What nutrition topics were discussed?
  - 3d. Did the course give you real life applications to the nutritional knowledge? For example, were you given ideas to reduce your fat intake in your diet?
4. Are there certain aspects of nutrition that you would like to know more about?
5. Are there changes you would make about the nutrition information taught in schools?
6. Are there nutrition programs you would like to have at your school?
7. Is nutrition talked about in your home?

This section will focus on the student's nutrition habits.

8. How would you describe a healthy eater?
9. Do you consider yourself to be a healthy eater?
10. Do you consider your friends to be healthy eaters?
11. Do you consider your family to be healthy eaters?
12. What influences your food choices?
13. Have your eating habits changed as a result of nutrition information you learned?
14. Are there certain aspects of your food choices that you would like to change?
  - 14b. If so, what is preventing you from doing that?
15. Is there something that you would like done within your school to help you improve your nutrition habits?



## Appendix F



## Brock University Research Ethics Board Clearance Letter

Office of Research Services  
 Research Ethics Office  
 St. Catharines, Ontario, Canada L2S 3A1  
 T: 905-688-5550, Ext. 3035/4876 F: 905-688-0748

[www.brocku.ca](http://www.brocku.ca)

DATE: April 4, 2008

FROM: Michelle McGinn, Chair  
 Research Ethics Board (REB)

TO: Joe Engemann, Education  
 Sarah Gray

FILE: 07-262 ENGEMANN/GRAY

TITLE: Nutritional Habits and knowledge of Adolescent Females

*Michelle K. McGinn*

The Brock University Research Ethics Board has reviewed the above research proposal.

**DECISION:** Accepted as Clarified.

This project has received ethics clearance for the period of April 4, 2008 to May 31, 2008 subject to full REB ratification at the Research Ethics Board's next scheduled meeting. The clearance period may be extended upon request. ***The study may now proceed.***

Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and cleared by the REB. During the course of research no deviations from, or changes to, the protocol, recruitment, or consent form may be initiated without prior written clearance from the REB. The Board must provide clearance for any modifications before they can be implemented. If you wish to modify your research project, please refer to <http://www.brocku.ca/researchservices/forms> to complete the appropriate form Revision or Modification to an Ongoing Application.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-Council Policy Statement requires that ongoing research be monitored. A Final Report is required for all projects upon completion of the project. Researchers with projects lasting more than one year are required to submit a Continuing Review Report annually. The Office of Research Services will contact you when this form *Continuing Review/Final Report* is required.

Please quote your REB file number on all future correspondence.

MM/kw